MORTALITY AS A MEASURE OF SPATIAL AND SOCIAL DISPARITIES IN DEVELOPMENT: A VENEZUELAN CASE STUDY

BY

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To my parents William W., and Helen E. Caudill, who instilled in me at a very early age an insatiable curiosity about every inch of this fascinating world.

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TABLE OF CONTENTS

PAGE

ACKNOWLEDGEMENTS ii

LIST OF TABLES vii

LIST OF FIGURES viii

ABSTRACT ix

CHAPTERS

I. INTRODUCTION 1

II. MORTALITY AS A SOCIAL INDICATOR 10

Introduction 10
Evolution of the Concept of Development 10
Leading Paradigms of Development 11
Neoclassical or Orthodox Economic Paradigms 13
Theoretical Origins and Conceptual Framework ... 13
The Orthodox Perspective and Regional Disparities 16
Critique of Orthodox Paradigms 19
Political Economy or Historical-Structural Paradigms 21
Conceptual Framework 21
Spatial Implications for Development Processes . 23
Contributions of the Dependency Paradigm 24
Critique of Earlier Historical-Structural Paradigms 25
World-Systems Theory 28
Growth-With-Equity Response and Human Needs Emphasis in Development Analyses 29
Pertinent Features of Paradigm Evolution 31
Measuring Development: Use of Indicators 33
Economic and Consumption Measures 33
Other Social Indicators 35
Demographic Indices of Devlopment 37
Indicator Requirements 37
Mortality as a Social Indicator 38
Determinants of Mortality 39
Household income 42
Education 42

Sanitation facilities and environmental risk 44
Urban versus rural residence 44
Other mortality determinants 46
Demography and Sociospatial Expressions of Development Disparities: A Summary 47

III. DEVELOPMENT IN VENEZUELA 51

Introduction 51
Geography and the Spatial Economy 51
General Description 51
Geographic Diversity 52
Origins of the Spatial Economy: Early Settlement Patterns 55
Major Regions of Venezuela 57
North Central Venezuela 57
Andes 60
Llanos 63
Zulia 65
Guayana 67
The administrative regions 68
Petroleum and the Economic Transformation of Venezuela 71
Early Stages 71
Dependency 74
Emergence of a New Venezuelan Social Structure. 76
The new technocratic and managerial elite ... 76
Structural change and remuneration to the work force 78
Transformation of the Economy and "State Capitalism" 80
Social and Spatial Inequities and National Policies 83
Regional Planning and Development 83
Centralized economy and government 83
Spatial planning 85
Public Health, Housing and Sanitation 86
Social Security 88
Education 88
Agricultural Problems, Rural Poverty and Agrarian Reform 92
Summary of Venezuelan Development and Changing Life Conditions of the Population 100

IV. METHODOLOGY, DATA SOURCE AND PROCEDURES 105

Mortality Estimation Techniques 105
Indirect Demographic Techniques and Brass-Type Procedures 105
Estimating the Mortality Level of a Population . 109
Model life tables 110

Life table function curves 112
Regional model life tables 113
Trussell-Preston Techniques for Estimating Childhood Mortality Covariates 115
Data Source 116
1981 XI Venezuelan Census of Population and Housing 116
Sample and Coverage 117
Procedures 119
Creation of the System File for Demographic Analysis 119
Variables Selected for Analyses 121
Use of the Income Variable and Income Levels ... 123
Application of Brass Technique to Selected Populations 127
Application of Trussell-Preston Mortality Covariate Estimation Procedures 131

V. SPATIAL AND SOCIAL PATTERNS OF MORTALITY IN VENEZEULA 135

Disaggregated Brass Mortality Estimates 135
Spatial Inequalities in Length of Life 135
Social and Economic Determinants of Mortality .. 142
Household income differences and length of life 142
Regional life expectancy by income and urban residence 144
Regional life expectancy by income and rural residence 146
Education 147
Childhood Mortality Covariates 151
The Significance of Location 155
Summary of Results 157

VI. CONCLUSIONS 163

APPENDICES

A. 1981 VENEZUELAN CENSUS SAMPLE SIZE AND WEIGHT FACTORS 171

B. COEFFICIENTS FOR ESTIMATION OF CHILD MORTALITY MULTIPLIERS, TRUSSELL VARIANT, WHEN DATA ARE CLASSIFIED BY AGE OF MOTHER 172

REFERENCES CITED 173

BIOGRAPHICAL SKETCH 186

LIST OF TABLES

TABLE		PAGE
3.1	Average Annual Remuneration per Worker by Economic Sector	79
3.2	Percentage Contribution of Agricultural Sector To Gross National Product	96
5.1	Average Number of Years of Life Expected at Birth By Region and Place of Residence, 1981	137
5.2	Rural and Urban Distribution of Population Sample By Region	139
5.3	1981 Venezuelan Population Distribution by Administrative Region	141
5.4	Life Expectancy at Birth by Income Level, 1981-- All Venezuela	142
5.5	Life Expectancy by Income and Urban-Rural Residence	143
5.6	Urban Life Expectancy by Region and Income	145
5.7	Life Expectancy Advantage: Capital vs Andes	147
5.8	Life Expectancy by Income, Education and Residence	149
5.9	Differences in Length of Life by Education, Residence and Income	151
5.10	Regression of Mortality Index of Children Born To Mothers 20-29 Years of Age on Selected Socioeconomic Variables in Venezuela, 1981	152
5.11	Means and Standard Deviation of Variables Regressed on the Mortality Ratio of Children In Venezuela, 1981	153

LIST OF FIGURES

FIGURE		PAGE
III-1	Physical Regions of Venezuela	54
III-2	States and Major Cities	59
III-3	Administrative Regions of Venezuela	69
V-1	Life Expectancy by Region and Rural-Urban Residence	138
V-2	Life Expectancy by Income, Education and Rural-Urban Residence	150

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If judged only in terms of traditional aggregate economic indicators, Venezuela's approach to development under democratic governments was impressive during the 1960s and 1970s. Prior to the fall in petroleum prices in 1982, the country's per capita income had been approaching the level of some developed countries and exceeded all other Latin American and some European nations. However, the social and economic transformations have been highly uneven in their impact on the country's regions, urban and rural populations, and socioeconomic classes. The aggregate indices of economic development conceal continuing wide disparities in income

distribution and access to public health and sanitation services between socioeconomic groups and geographic areas.

This research assesses the spatial and social patterns of uneven development in Venezuela in 1981 using mortality levels, expressed as life expectancy at birth, as an index to measure variations in the material conditions of life within the country. Indirect demographic techniques were used with census sample data to estimate differences in length of life between populations differentiated by place of residence and socioeconomic characteristics. Although average life expectancy is quite high in Venezuela, approximately 68 years in 1981, social and spatial disparities in Venezuela's development were clearly reflected in differential mortality rates. Of the populations compared by disaggregated mortality estimates, a maximum range of more than nine years' difference in life expectancy was observed between Venezuela's most and least advantaged groups.

A second technique was applied in the investigation, using a recently developed method to regress selected mortality variables against the mortality ratios of children of individual mothers to control simultaneously all of the variables included in this research. Analyses show the mother's level of education, household income, housing quality, urban or rural residence, and region of residence to be statistically significant determinants of mortality among the Venezuelan population.

CHAPTER I
INTRODUCTION

In developing nations, mortality rates are useful indicators of a population's standard of living. Conventional means of obtaining measures of mortality require a system of complete and accurate vital registration statistics. Improvements in indirect methods of estimating mortality have greatly advanced mortality research in developing countries where vital registration data is frequently unreliable. Indirect demographic techniques use survey or census sample data, simultaneously avoiding vital registration deficiencies while increasing the range of variables which can be included in mortality research. This study demonstrates the application of these methods in Venezuela using the 1981 census sample of population and housing.

As Judith Ewell (1984, p.1) observed, "No other country in Latin America has been so entirely transformed in all aspects of national life as Venezuela has since 1900." Revenues from petroleum exports transformed the country from one of the poorer nations in the region at the turn of the century, with a predominantly agricultural economy dependent on North Atlantic markets and a largely rural population with a high mortality rate, into a highly urbanized,

industrializing nation with the continent's highest per capita income (Ewell, 1984; Lombardi, 1982; Brito, 1979). Political changes were comparably dramatic, breaking a 137-year tradition of civil wars and military dictatorships to establish a populist, multi-party democracy in which presidents of different parties have now peacefully succeeded each other according to election results for nearly thirty years.

A broad-based revolution in 1958 deposed the last dictator, Perez-Jimenez, and a series of elected presidential administrations, beginning with Romulo Betancourt in 1959, have taken an increasingly active role in planning and participating in the nation's economic growth. Programs and policies intended to diversify and decentralize growth and provide social benefits were high among the priorities of the new government. The disparities that existed at the end of the dictatorship era between Venezuela's poorer and wealthier regions and populations were pronounced. In 1960, two years after the revolution, the per capita income in less developed areas of the country was approximately 45 percent of that in the Caracas Metropolitan area (Jones, 1982) and a United Nations study reported that Venezuela in the early 1960s had one of the most unequal income distributions in the world (Ewell, 1984).

The stated national policy of Venezuela's post-revolutionary governments has been to reduce the disparities

in the income and quality of life of the population and the spatial imbalances in economic development (Jones, 1982; Lombardi, 1982; CORDIPLAN, 1981; Martz & Myers, 1977; Friedmann, 1966). The tool which the national government used in its efforts to achieve those goals was income from petroleum exports. The substantial size of the revenues derived from this resource meant that the state could pursue a dual-track approach to development which would simultaneously allow it to satisfy more demands and require fewer sacrifices from its people compared to most developing societies (Tugwell, 1977).

The strategy for development pursued by Venezuela could most aptly be characterized as a form of "state capitalism," involving extensive active participation and planning by the national government in key sectors of the economy. Political leaders and economic planners have devised national development plans from an eclectic and pragmatic planning-oriented perspective of economic development which is still orthodox in the basic views of the processes of economic growth.

Venezuela is fortunate to have not only an extraordinary endowment of petroleum reserves but also substantial deposits of other mineral resources including iron ore, coal, bauxite, diamonds and gold. With a relatively small population, the nation has had the resources to spare to boldly undertake large-scale projects, subsidize experimentation and survive

costly errors which would have been disastrous to other developing countries (Stewart, 1977). Because of the rapid growth in the production of petroleum, steel and aluminum as the dominant components of the economy, an economic environment has existed in which the traditional opposition of the landed elite to economic and social reform, so characteristic in other Latin American nations, has been less forceful. At the national level, their influence was at least partially displaced through relegation to a less powerful role in the nation's affairs as they were replaced by a new elite which managed the new industries that came to dominate the economy.

The sudden increases in the international price of oil in 1973, so devastating to many other developing countries, provided Venezuela with an even greater bonanza for its government coffers. This event, partially responsible for terminating the economic "miracle" of Venezuela's neighbor, Brazil, pervasively affected national life with a mood of nearly boundless optimism and it was thought that at last Venezuela could buy a place among the developed countries (Blank, 1984).

If judged only in terms of traditional aggregate economic indicators, the Venezuelan approach to development was certainly successful, at least until the middle 1980s. Growth of the economy was quite rapid, averaging 5.9 percent per year increase in GNP from 1960-1970 and 6.04 percent per year from

1975-1979 (Lombardi, 1982). Prior to the fall in petroleum prices in 1982 and the subsequent devaluation of the formerly stable bolivar, per capita income in Venezuela ($2,910/year in 1978) had been approaching the level of some developed countries. The 1970-75 per capita GNP average was $2,171, comparable to the Soviet Union ($2,380) and exceeding all Latin American and several European countries including Greece, Portugal and Yugoslavia (Morris, 1979). By 1983 GNP per capita annual income reached $3,830, over $1,300 more than Argentina, the next most prosperous country in Latin America (Wilkie, 1987, p. 278).

However, the social and economic transformations have been highly uneven in their impact on the country's regions, urban and rural areas, and socioeconomic classes. The aggregate indices of economic development conceal continuing wide disparities between households in income distribution and access to public services and health-related infrastructural improvements between households, geographic areas and economic sectors. This research is an inquiry to measure the extent of those disparities as reflected in demographic measures of the condition of the population.

Martz and Myers (1977) noted that Venezuela's democratic reformist experiment had been of little interest to the outside world because Cuba's developmental socialism and Brazil's military reformism had attracted more interest and excited greater passions among those interested in the region.

The same could perhaps be said of more recent discussion of issues concerning the region, with Chile's "Chicago School" style of economic development attracting the interest of orthodox developmental economists and the Nicaraguan experiment appealing to ideologues of the left. Venezuela's brand of "state capitalism" is not attractive to the purists of either orientation. The country's dependence on the export of one product--petroleum--mostly to the developed North Atlantic nations, and the importation of the life-style and institutions of those countries is particularly unappealing to dependency theory advocates. At the same time, state ownership of the largest production components of the economy is objectionable to orthodox developmental economists. Although a capitalist country, the Venezuelan public sector is more important, relative to the size of the economy, than anywhere in the Western Hemisphere, except possibly in Cuba (Tugwell, 1977). In one author's opinion, "There is too much complexity and contradiction in Venezuela to justify the application of simplified explanatory models," (Blank, 1984).

An examination of Venezuela's experience with efforts to improve the living conditions of the population concomitant with goals of national economic growth and a pluralistic political environment is pertinent to a number of crucial questions in contemporary development research. Evidence from developing countries has generated concern about whether and to what extent increasing inequalities in the material

conditions of life are inevitable consequences of economic growth in economies that are not centrally planned (Chapter II).

Venezuela has one of the few elected national governments of any duration in Latin America. Consequently, national development strategies and policies are subject to political pressures of the various interest groups and socioeconomic factions of the population. The outcome of Venezuela's efforts to "sow the petroleum" may provide some insights about whether and how any new nations can achieve a secure place in the developed world (Ewell, 1984).

The objective of this research is to use indirect demographic techniques of mortality estimation to obtain measureable indices of the outcome of Venezuela's style or strategy of development in terms of living conditions of the population as they vary spatially and socially in 1981. Estimations of mortality levels for specified populations will be expressed as life expectancy at birth, an easily communicated summary of population mortality. Several distinct topics are examined to build the conceptual framework for this study. The literature pertinent to each topic is included in the appropriate chapter rather than reviewed separately.

Chapter II reviews the major development perspectives and develops the rationale for the use of mortality as an index of development. The evolution of the leading research

paradigms in the post-World War II era is summarized and their respective means of interpreting and assessing development are examined. Mortality, expressed as life expectancy at birth, is posited as a useful indicator of a population's quality of life with cross-cultural applications.

In Chapter III, salient features of Venezuela's geography are described and the profound economic and social changes occurring in recent decades are reviewed, with emphasis on their impacts on the life conditions of the population. The interplay of geography, politics and economics is examined in terms of their resulting spatial and social disparities in material well-being. The discussion is essential to understanding the social and economic context in which the research techniques are applied and to interpreting the results.

The logic of the Brass-type indirect demographic estimation techniques used in this research is presented in Chapter IV. Combining the techniques with the census public use sample survey of households enables the researcher to derive mortality estimates for populations specified by virtually any variable included in the census data. Because information about the geographic location of the surveyed households is attached to the individual census record, the indirect demographic methods greatly enhance population geography research in developing countries.

Substantive findings on spatial and social differences in life expectancy and the relative impact of determinants of mortality are presented in Chapter V. Patterns of mortality in Venezuela are analyzed and summary comments attempt to place the results in perspective. Some comparisons are made with studies in Brazil, where the same techniques have been employed.

Chapter VI offers concluding comments about the processes of social and economic change in Venezuela as they are reflected in the measures obtained through this research and raises questions for further inquiry. The utility and application of the techniques employed are assessed in terms of the extent to which the research objectives have been achieved.

CHAPTER II
MORTALITY AS A SOCIAL INDICATOR

Introduction

This chapter establishes the rationale for introducing indirect demographic techniques and their applications in population geography to the analysis of development. The first part of the review outlines the basic features of the two leading development paradigms as they pertain to this research. The second part explains the need for a technique with the capability of conducting analyses of development by disaggregated social and spatial criteria which also effectively summarizes the impact of development processes on the living conditions of the population. The advantages of life expectancy as a summary indicator in cross-cultural, international, and sub-national comparative analyses of the life conditions of selected population groups are posited. Finally, the selection of determinants of mortality to be used in this investigation of mortality patterns in Venezuela is explained.

Evolution of the Concept of Development

Inequalities in the material welfare of people within and between nations are not a new situation (Cole, 1981) but it was not until the end of World War II that the concept of

"underdevelopment" emerged (Cole, 1981; Gilbert, 1976). Wilber and Jameson (1984) account for this recent awareness as stemming from 1) failure of world markets to alleviate the problems of poor nations as promised by orthodox economics, 2) the existence of socialism as an alternative development model and 3) the large number of former colonies which had become politically independent after the end of the war and began to press for changes in economic relations as well.

In the decades since, prodigious quantities of research, writing and money have been devoted to the analysis and promotion of development, yet there is no generally agreed upon definition of the concept or explanation of the processes involved (Toye, 1987; Preston, 1985; Carley and Bustelo, 1984). The following discussion highlights the central concepts of the two leading categories of development paradigms in view of their relevance to the selection and use of mortality levels as a social indicator to describe and analyze social and spatial patterns of quality of life.

Leading Paradigms of Development

Most perspectives and analyses of development are derived from one of two principal paradigms. Each has a variety of labels and there is considerable disagreement and diversity within each paradigm. One has been called either the neoclassical or the "orthodox" or the "modernization" view of development (Apter, 1987). This group includes free market models, planning approaches and the newer, growth-with-equity

response to the first two. The second group of paradigms, sometimes called either the historical-structural or political-economy perspective, includes the theorists of the dependency school, non-dependency Marxists and adherents to world-systems theory. Embodied in the perspectives of these two leading paradigm categories are definitions, theories, methods and units of analysis so different that communication or comparison of research results between them is difficult or impossible (Wood, 1981).

There are, however, similarities between the two groups in their shared view of history as progressive change. According to that view, history is not just change through time but change in a certain direction--a linear direction. Preston (1985) and Culbertson (1984) contend that "belief in progress" is a fundamental view of both the orthodox economic and the historical-structural paradigms. Most subscribers to each set of paradigms presume that it is desirable to move through processes or changes to become "developed" or at least self-reliant (in the case of the dependency theorists). The two views begin to diverge radically in their respective explanations of development and underdevelopment to the extent that there is not even a commonly acceptable definition of development nor agreement on what recent changes in developing countries represent. A vast amount of literature has been generated by the vigorous debate between the two paradigms and by the internal divisions within each. The following section

summarizes only the main features of the two perspectives and provides critical comments as they pertain to this investigation of patterns of mortality in Venezuela.

Neoclassical or Orthodox Development Paradigms

Theoretical Origins and Conceptual Framework

Much of the early development literature originated within the neoclassical economic perspective and generally assumed that the nature of the desirable society or model of development was already known (Rostow, 1960), usually taken to be an ideal version of the western industrialized nations. High per capita consumption of material goods was considered the objective to be achieved through increasing the gross national product and per capita income (Wilber and Jameson, 1984). These assumptions are evident in the frequent synonymous use of "growth" and "development" in economic discussion although they technically refer to two different but sometimes overlapping concepts (Kindleberger and Herrick, 1977).

The history and process of development in the neoclassical paradigms are viewed as an almost law-like sequence of events in which nations progress from a state of low productivity and consumption to successively higher levels of material consumption until reaching the "developed" level exemplified by Western Europe, or North America (and now--Japan). The most orthodox and well-known formulation of this

view is Rostow's (1960) "stages of growth" model. The conceptual basis of stage theories is the proposition that development is a linear historical process with all national economies being located (in Rostow's model) at one of the five posited "stages" in that process, ranging from the least developed "traditional societies" to the most developed industrial consumer societies. From this perspective, the economies of Latin America are considered to be developing economies at some point in one of the transitional phases between the "traditional" and "industrial" stages of development. The explanation of underdevelopment, in this most orthodox of the neoclassical views, is simply the country's position in the sequence, that is, the particular underdeveloped nation has yet to go through all the "stages" of becomming developed, usually by receiving the diffusion of "modernization" from the more developed countries.

Another implicit assumption regarding development is evident in the "stages" model of development: the assumption that "developed" and "industrialized" are synonymous. Use of the industrialized nations as the model toward which all other countries (presumed to be in a "lower stage") should strive, incorporated the industrialized-equals-developed definition into the paradigm, which subsequently became an integral part of analyses of the problems of underdeveloped nations. The problem of achieving development was construed as essentially

the problem of how to become industrialized in the most expedient fashion.

Since the neoclassical explanation of the process of development is based on the model of competitive market capitalism, obstacles to development are interpreted to mean that something has interfered with the presumed automatic, self-regulating market mechanisms which otherwise would lead inexorably, in the course of time, to development (Apter, 1987; Eisenstadt, 1973). Consequently, it was a logical step to the proposition that progress toward development is primarily achieved by overcoming obstacles to development (Dicken, 1986). Analysts investigated a broad and diverse range of obstacles including social, cultural and psychological constraints of traditional societies, government regulation and participation in the economy and other sources of market imperfections (Apter,1987; McClelland, 1964, 1961).

Offshoots of the basic paradigm's premise of evolutionary phases led to lines of inquiry into the psychological and cultural nature of the "traditional" societies to identify cultural and psychological "blockages" to development processes. In his article, "A Psychological Approach to Economic Development," McClelland (1964) exemplified the view of writers of the "psychological-behaviorist" school who attempted to identify "backward" or, more benignly, "traditional" attitudes responsible for impeding development.

Diffusion of "modernization" from the more developed to the less developed nations and "push" in the form of technology, large-scale capital investment or changing the cultural, social and psychological patterns of the population or a combination would propel the society further toward the final stage of "industrial maturity". The question of equity in the benefits derived from the presumed changes was left to the "trickle-down" mechanism which would presumably solve the problem of income distribution after the initial phases of economic growth.

The Orthodox Perspective and Regional Disparities

From a spatial perspective of development processes, the concepts of neoclassical economics and linear development embodied in the stage theories have influenced the evolution of regional growth theory and policy, particularly the "growth pole" concept (Perroux, 1988, 1955; Polenske, 1988) and generated an extensive body of literature (Higgins and Savoie, 1988). Elements which have become components of the growth pole concept include factor mobility, general equilibrium theory and the process of diffusion (Richardson, 1988, 1973). Underdevelopment is perceived as a spatial disequilibrium in the allocation of productive factors of capital, labor and resources. The scale of this spatial disparity may range from the world down to the province or even the urban center and its surrounding rural hinterland (Friedmann, 1966).

In the orthodox perspective, the disequilibrium in economic factors of production and the welfare of the population is theoretically always in the process of becoming balanced by flows of labor (migration) and capital from "surplus" to "deficit" areas. The movement of population and/or capital is viewed as an equilibrating component, hypothetically reducing the wage/capital ratio differentials between regions, thereby evening the spatial distribution of development (Alonso, 1988; Higgins and Savoie, 1988; Pryor, 1975).

These theoretical assumptions about the tendency toward equilibrium have been linked with the concept of spatial diffusion of "modernization" features of economic activity, or essentially, the diffusion of innovation (Rondinelli, 1983; Gilbert, 1975; Babarovic, 1972). In one of the earliest formulations of this view of spatial development processes, Myrdal (1957) used the term "spread effects" to describe the diffusion of development from the growth centers and "backwash effects" to identify both the positive and negative impacts of growth centers on the economies of surrounding areas. In theory, as industrialization or modernization (they are often equated in the neoclassical paradigm) proceeds through the development stages in growth centers, those centers serve to facilitate diffusion of modernization outward through the surrounding smaller cities and countryside (Rondinelli, 1983; Brown and Gilliard, 1981). Interestingly, the growth pole

concept has crossed ideological barriers to become incorporated into development planning approaches used by both socialist and capitalist governments in developed and developing countries (Rondinelli, 1983; Gilbert, 1975).

Advocates of the growth center approach postulate that areas surrounding dynamic centers are accelerated through their own development stages and become more effectively incorporated into the national economy. It is assumed that incorporation into the national (and international) economy is a beneficial process to the "backward" areas, a position in direct opposition to the viewpoint of dependency analysis (Polenske, 1988).

Accumulating evidence of increasing inequality and unemployment sparked the interest of some theorists working within the neoclassical paradigm, some of whom began to devote attention to the social and economic inequalities of the economic changes which were occurring in most of the developing countries experiencing rapid aggregate growth rates. In a comprehensive study of regional disparities, Williamson (1965) concluded that regional inequality increases during the early stages of development and convergence occurs during the mature phases of growth. Extending the investigation to include other features of development and societal transformation, Alonso (1980) characterizes the course of those changes through time as conforming to bell-shaped curves rather than linear. He describes five processes

of social and economic change according to the bell-shape representation: 1) development stages, 2) social inequality, 3) regional inequality, 4) geographic concentration, and 5) demographic transition.

Reformulations of earlier views were developed but much of the original neoclassical conceptual framework remained firmly a part of development thinking and terminology (Friedmann and Forest, 1988). One of these reformulations, the "counter-revolution" in development theory asserts even more vigorously the principles of free markets and non-intervention by government (Toye, 1987).

Critique of Orthodox Paradigms

At both the international level and the subnational or regional level, data have tended not support the predictions of the orthodox paradigm which assumed declining inequality of income through the "trickle down" process. Growth in GNP concurrent with increasing unemployment and inequality have been fairly typical and largely unanticipated features of the experience of developing countries (Fields, 1980; Nugent and Yotopoulos, 1979; Todaro, 1977). However, Gilbert and Goodman (1976, p. 119) conclude that their data fails to support either convergence or divergence in regional differentials over time.

Problems of unemployment, unequal income distribution and disparities in regional development are certainly not unique to underdeveloped countries. Even in the advanced

industrialized economies of Europe, with far-reaching policies of national level government planning, the economic problems of some regions, such as southern Italy, and the continued disparities in economic and social well-being between areas have proven very persistent (Gilbert and Goodman, 1976; Sundquist, 1975). But it was in a number of the underdeveloped countries where the most surprising phenomena of increasing unemployment and inequality were occurring at the same time that their economies were experiencing unprecedented high rates of growth (Nugent and Yotopoulos, 1979).

An important criticism of orthodox approaches to development, pertinent to this research, concerns the means which have been employed to measure or signify development. The most frequently used indicator is Gross National Product (GNP) per capita and/or per capita income. Use of GNP per capita to measure development performance implicitly incorporates into research and discussion the development goal of the neoclassical paradigm: economic growth and the attainment of a high mass consumption society. The limitations of this indicator as a measure of development is pertinent to the purpose of this research and is discussed in more detail later in this chapter.

Another deficiency of the early modernization approaches to development also concerns the units of analysis used. Earlier investigations into development processes usually

employed the nation-state as a discrete unit (Lipshitz, 1986; Cole, 1981), thereby aggregating the country's entire economy and population into an undifferentiated mass as well as isolating the internal features of the nation's development from consideration of external influences (Higgins and Savoie, 1988; Toye, 1987).

Political Economy or Historical-Structural Paradigms Conceptual Framework

In reaction to a number of the shortcomings of the earlier neoclassical stage and equilibrium theories of development, theorists of the political economy schools of development analysis, particularly from Latin America, began in the 1960s to postulate their own explanations of the observed processes. The two leading viewpoints within the political economy paradigm are the Marxists and the dependency theorists who differ primarily in their respective identification of the locus of power which is seen as the control and use of a society's economic surplus (Weaver and Berger, 1984; Warren, 1979).

Two of the earliest and most influential of the statements describing and defining the exploitive nature of the relationship between the developed and underdeveloped nations were Paul Baran's The Political Economy of Growth (1962) and Andre Gunder Frank's (1969) article, "The Development of Underdevelopment." They postulated the thesis

that underdeveloped countries and regions (the periphery) were underdeveloped because of their relationship to the developed nations (the metropolitan center). They were later joined by others (Amin, 1976; Wallerstein, 1974; Cardoso, 1973, 1972; Dos Santos, 1970; Furtado, 1965), forming the basis of what has become known as the dependency school.

Rather than taking the nation-state as the unit of analysis and GNP as the measure of performance, the foci of dependency analyses are the relationships between developed and underdeveloped nations. The concept of economic surplus and its extraction and exchange is used to explain underdevelopment. Dependency theorists emphasize the exploitive relationship of the economies of the developed nations with the underdeveloped nations through mechanisms of extracting economic surplus. Exploitation of the periphery operates through the mechanisms of remittance of profits by transnational corporations to their home countries (the core) and by the unequal terms of trade through which commodities are exchanged (Frank, 1969; Baran, 1962). The basis of the theorized mechanism for the extraction of surplus through unequal terms of trade was the work of Raul Prebisch (1950) and other analysts from the Economic Commission for Latin America. They used orthodox economic analyses of historical trade data between developed and underdeveloped countries to reveal the increasing comparative market advantage of the

products of the developed nations compared to the exported primary products of the underdeveloped countries.

Dependency advocates contend that the structure of the economic relationships between the developed "core" and the underdeveloped "periphery" "creates underdevelopment" and does not result in movement toward a developed status or trends toward equilibrium as predicted by conventional economic theories of development. From the dependency perspective, it is argued that the historical process of capitalist expansion throughout the world simultaneously generates both economic development and underdevelopment (Brookfield, 1975, p. 163).

Spatial Implications for Development Processes

Spatial and social inequalities in development within and between nations is a primary focus of interest within the dependency perspective. The mechanisms of exploitation and unequal development proposed by the dependency paradigm form a chain of satellite relationships which extends from the metropolitan core nations to the urban cores of underdeveloped nations. The chain is then linked to the rural and peripheral areas of the underdeveloped nations. The relationship of peripheral areas of an underdeveloped nation to its own urban core is frequently termed "internal colonialism" (Frank, 1967). In this relationship, wealth is extracted from peripheral rural areas to the metropolitan centers within the country and from there to the developed nations.

At the regional (intra-national) level of analysis, the conclusions of dependency theory regarding trends in the internal spatial patterns of unequal development within a country (that is, between its core and peripheral areas) are again contradictory to those of orthodox or neoclassical equilibrium theories. From the dependency perspective, processes which tend toward increasing rural-urban and interregional imbalances in development and income are cumulative rather than self-regulating. The theoretical position regarding national planning of development in underdeveloped countries, especially through investment in and expansion of growth poles, is that it is a deepening of the dependent relationship of the center with the periphery through further expansion of the international capitalist system (Santos, 1977).

Contributions of the Dependency Paradigm

Theorists of the dependency paradigm drew attention to the flaws in the early neoclassical stage theories, especially the exclusive focus on the particular nation-state and its internal processes, observed in isolation from external influences, as the unit of analyis for investigation into the causes of underdevelopment. The dependency theory critique emphasizes the role and influence of the developed nations and the external economic forces which inhibited the indigeneous development processes in the underdeveloped world. The dependency paradigm revealed the limitations and problems

which confront and inhibit the development processes of an underdeveloped nation when its larger industries and more dynamic sectors of its economy are under foreign control.

Expanding the scope of investigation beyond the boundaries of specific countries and including the concept of structural limitations in viewing the nature of relations between blocks of nations were dependency school contributions which spread to varying degrees to other paradigms. Dependency theorists also focused attention on the unequal results of development processes including increasing income inequality, disparities in regional development and further concentration of land ownership. They viewed these outcomes of capitalist development or "penetration" which were clearly contradictory to predicted trends toward equilibrium as support for the theory of surplus extraction as the cause of underdevelopment.

Critique of Earlier Historical-Structural Paradigms

In its most dogmatic expressions, dependency theory presents a determinist view of dominance by the metropolitan core which does not allow for the possibility of development in underdeveloped countries under the prevailing economic system (Dicken, 1986; Portes and Walton, 1981). Completely reversing the nation-centric focus of earlier orthodox development paradigms, the dependency perspective placed the locus for the cause of underdevelopment on external forces and surplus extraction as the mechanism involved. These causes

were not posited just as part of a complex web of conditions and processes explaining differences in development but were emphasized to the exclusion of other legitimate contributing factors and explanations. The explanations became generalizations, ignoring specific differences and outcomes in many underdeveloped countries where development and improvement in living conditions is in fact occurring, a flaw also noted by non-dependency Marxists including Weaver and Berger (1984) and Warren (1979). Heterogeneity among Third World countries, particularly variations in income and social well-being, is greater than between industrialized nations (Dicken, 1986). Paul Streeten (1984) points out that many of the problems of developing countries are common problems of all nations: there are relations of dominance and dependence between developed countries and relations between industrial and developing countries are replicated in the relations between stronger and weaker underdeveloped nations.

Many of these same features and relationships can also be observed in socialist nations. Within and between socialist countries there also exist relations of dominance and dependency (Cuba and the Soviet Union), underdeveloped countries (Cambodia, Albania, Burma, Ethiopia) and developed industrialized countries (Soviet Union and most of Eastern Europe), significant spatial disparities in level of material well-being (Fuchs and Demko, 1979) and patterns of migration

and emigration attributable to those disparities (Soviet Union, Yugoslavia, China).

Difficulties are encountered in comparisons of analyses of development processes between dependency theorists and those of the orthodox perspective (as well as non-dependency Marxists) because there is no agreed-upon definition of what constitutes development or dependency. If "liberation" or cultural autonomy is the issue (see Denis Goulet, "Development or Liberation?," 1971 and Worsley, 1984) rather than material well-being, then the terms of the argument have shifted so that "development" has become disconnected from consideration of the level of material well-being.

Different versions of what development and dependency mean cause difficulties in attempting to make any comparative measures of development within the dependency perspective as well as between dependency and orthodox analyses. If underdevelopment is defined in terms of relations of comparative international power or influence, these relations may be difficult to capture in quantifiable indices. Canada and Australia, for example, which have very high levels of direct foreign investment as well as other forms of foreign influence by the United States and Japan, respectively could be considered "underdeveloped." On the other hand, Burma, one of the world's poorest nations in the material level of living, but with a socialist government which delinked from the world capitalist economy (or any economy) for twenty-five

years and has virtually no foreign investment or cultural influence ("A Chance to Meet Burma..," The Economist, July 30, 1988) would have to be considered "developed."

World-Systems Theory

World-systems theory has contributed the perspective stressing the need for analysis of development in the context of a global perspective. In this view of development, the world system is the unit of analysis and parts of the model, whether groups of nations (core, periphery or semi-periphery), nations or regions are observed strictly in terms of their relationship to the global economy (Wallerstein, 1974). Mechanisms posited by world-systems theorists by which the exploitation of the periphery by the core takes place are essentially the same as those proposed by dependency theorists: extraction of surplus by profit remittance and unequal exchange of commodities. However, they shared with earlier modernization theorists the tendency to focus on a narrow view of the processes involved. Analyses conducted only at the global level obscured distinctions between the conditions and processes specific to individual countries. Furthermore, by ignoring the role of internal factors, important features of the type and operation of linkages between the global systems and the local conditions are not examined (Tilly, 1984).

Growth-With-Equity Response and Human Needs Emphasis in Development Analyses

Awareness of the negative features of growth-oriented development strategies (emphasized in dependency literature) crossed paradigm boundaries to stimulate the growth-with-equity response in more orthodox analyses (Fields, 1980 p.8) and created a widespread emphasis on meeting the needs of the population rather than simply increasing economic output (Hopkins and Van Der Hoeven, 1983 p.4; UNRISD, 1976; ILO, 1976). The negative results described earlier included increasing income inequality, unemployment and spatial economic disparities in many (though not all) developing countries. In some cases, the income of the poorest strata of the population had actually fallen absolutely and not just as a relative percent of the other income levels. The "growth versus distribution" debate, an underlying issue originally separating political economy and orthodox development paradigms eventually became a dividing issue between the new perspectives emphasizing growth with distribution evolving from the orthodox school and the "counter-revolution", a re-statement of the free market equilibrium view (Toye, 1987).

The growth-with-equity approach places greater emphasis on social and political variables to achieve economic growth with equitable distribution rather than the narrow focus on economic factors of land, labor and capital. This emphasis, along with a preference for delivering goods and services

directly rather than relying on markets, places the growth-with-equity theorists closer to the political-economy paradigm (Wilber and Jameson, 1984).

A wide variety of development strategies are found within the perspective, but the two most prominent are the "New International Economic Order" and the "basic needs" strategy. In turn, these two approaches have a number of interpretations, causing the boundaries between paradigms to become increasingly blurred. Advocates of the New International Economic Order argue for the necessity of restructuring international institutions and economic relations to improve conditions within developing countries (Hopkins and Van Der Hoeven, 1983; Streeten, 1982). Among them are adherents of the dependency perspective, including Celso Furtado (1965).

The "basic needs" approach considers the goal of development to be meeting the basic needs of people including food, water, shelter, medical care, education and participation in decisionmaking (Bunge, 1981). Economic growth is considered a necessary but not sufficient element in meeting the desired objectives of development (Fields, 1980). The basic needs approach has gained wide acceptance in the literature on development (Hopkins and Van Der Hoeven, 1983; Ho, 1982; Martorell, 1982; Drewnovski, 1974) and with agencies involved with international development assistance (ILO, 1981, 1977, 1976; UNRISD, 1976). However, when

development is considered to be the pursuit of objectives beyond levels of economic output (measured in GNP per capita), some means of measuring movement in the direction of those goals is required.

Pertinent Features of Paradigm Evolution

The preceeding discussion of theoretical perspectives on development emphasized their contrasting explanations of development processes, the diversity of experiences among developing countries and their divergence from the predictive statements of the leading paradigms. The sheer number of variables involved, the complexity of their interaction and the difficulty in isolating the myriad of social, political, economic and geographic variables for comparative quantitative analysis are largely responsible for these shortcomings (Apter, 1987).

A serious difficulty is also encountered in comparing research between paradigms because of the ideological nature of development issues and concepts. Assessing a nation's or an area's development is inherently a discussion of ideologies, values, semantics and definitions (Apter, 1987 p. 7-9; Preston, 1985 p.24). It is impossible to disentangle explanations, definitions and measures of development from implicit assumptions about what is desireable to be measured or not measured. Those assumptions, shared by researchers within a paradigm, define the scope of what is considered

legitimate scientific inquiry (Kuhn, 1970) and even what constitutes "facts" in analysis. Theorists of the competing paradigms often ignore or deny the terms of discussion or conceptual validity of the other.

Development paradigms are founded on implicit value systems which cannot be subjected to falsifiable theoretical testing. If, for example, a development theorist's value system defines economic growth or output as the objective of development, only the means of achieving those objectives can be empirically verified, not the legitimacy of the underlying assumptions about what form of development is desirable. The lack of consensus on a conceptual model for development has impeded the design of a widely accepted system of social indicators (Carley and Bustelo, 1984, p. 199).

It is therefore necessary to state the value perspective adopted in this research. That point of view is closest to the "basic needs" outlook on development and is perhaps best summarized by the statement: "The ultimate goal of economic development is to improve the well-being of people (Mahler, 1980, p.67)." This interpretation of development is the underlying principle behind the selection of mortality levels as a significant measure of the outcome of development processes as they affect the living conditions of people. The rationale for the selection and application of this indicator are described in more detail in the discussion of demographic indicators in this chapter and in Chapter IV.

Throughout the literature of the different paradigms there have been at least two persistent outcomes or features of development processes noted by most authors. Spatial disparities in development, however conceived, explained or measured, have been apparent at all levels of observation--international, regional and rural versus urban. The other noted feature is the inequality of distribution of the benefits of social and economic change among population strata. The two dimensions of unequal development are frequently different ways of observing the same phenomenon as the economic changes often have different impacts on populations who reside in different locations. To be useful in comparative analyses of these processes, an indicator which reflects living conditions should have a flexible potential for application to populations defined and disaggregated by spatial and social criteria.

Measuring Development: Use of Indicators

Economic and Consumption Measures

The earliest and most widely used indicator of development, one long favored by orthodox development economists, is Gross National Product (GNP) per capita. This measure of economic output was created for system of national accounts which was developed in the 1930s and 1940s in Great Britain and the U.S. and was designed to deal with resource mobilization and allocation problems of depression and

unemployment in highly developed economies (Morris, 1979). But when the attention of development economists turned to the problems of developing nations after World War II, it was a convenient, though ethnocentric, response to use an existing analytical tool which had served well in the economies where it had originated. As neoclassical theorists began to compare levels of living and to analyze regional inequalities in developing countries, the income or GNP per capita indicator was extended to these investigations under the assumption that it reflects regional economic welfare (Lipshitz, 1987; Richardson, 1978).

A number of difficulties were soon encountered as analysts attempted to use average GNP figures in developing societies eventually leading to widespread dissatisfaction with its utility under these circumstances (Carley and Bustelo, 1984; Bunge, 1981; World Bank; 1982; UNRISD, 1978; Baster, 1972). Morris (1979) has summarized the major drawbacks of GNP per capita as a measure of the level of social and economic well-being in underdeveloped areas: 1)It is a measure of economic performance founded on the assumption of an almost completely market-oriented economy in which virtually all goods and services have price tags and all transactions are recorded. The assumption is obviously inappropriate in countries where much of the economic activity is not based on market exchange. 2) GNP is a measure of output or production, not of consumption, and is seriously

flawed as a measure of welfare. 3) As an arithmetic average, it does not capture the pattern of distribution of the product. 4) There are serious problems in attempting to make international comparisons because of problems in the currency exchange rate method used.

These deficiencies led to a rejection of per capita average income growth as an adequate indicator of national development by many theorists and agencies involved in development research or assistance programs (Toye, 1987; Bunge, 1981; Fields, 1980; ILO, 1977; UNRISD, 1976). A long-term effort by the United Nations International Comparison Project has developed a methodology improving cross-national comparisons of incomes (World Bank, 1982, p. 23). Income remains an useful indicator in development analyses and policy implementation when viewed as a principal determinant of welfare, rather than as the principal outcome (Fields, 1980, p.9), and when some of its other deficiencies can be avoided in the context of developing nations.

Other Social Indicators

The deficiencies of GNP per capita as a measure of development stimulated various attempts, especially by international organizations, to utilize other indicators or to develop composite indices to capture the level of welfare of the populations of developing countries (IBGE, 1979; ILO, 1977; UNESCO, 1981, 1976; UNRISD, 1978, 1976; U.N. 1961). Attempts to construct social indicator systems in developing

countries were beset by even greater problems than those encountered in statistically advanced countries. Carley and Bustelo (1984) list some of the difficulties encountered: 1) lack of consensus on a conceptual model of development processes (emphasized in this chapter); 2) failure of development planning models during the 50's and 60's; 3) the social indicator systems which were developed (usually composite or multiple indices) were highly complicated and required a large volume of information; 4) the systems designed (usually in developed countries) often failed to appreciate the difficulties involved in obtaining the required data in less developed nations; 5) unreliable data sources.

In addition, as in the case of GNP per capita, few indicators served well when attempting international or cross-cultural comparisons. The types of indicators selected usually measured some aspect of consumption such as type of housing, clothing or calorie intake. These measures are extremely prone to ethnocentric value assumptions. Even nutritional standards are subject to ethnocentric biases (Morris, 1979). Average calorie intake, for example, does not measure nutritional well-being because of the vastly different requirements for humans of different physical structure under different conditions of activity and environment.

The need to measure results and not inputs remained a serious problem (Young et al., 1983; Fields, 1980; Morris, 1979, p.28). Use of multiple or composite indicators

frequently was defective because of the tendency to include include a mixture of indicators measuring both inputs to quality of life and results (Morris, 1979). In his study of the spatial spread of development around an urban center, Gilbert (1975) used multiple indicators including housing quality variables, medical facilities, infant mortality rates and even the number of telephones. Using this methodology, determinants of mortality, or inputs, were being mixed with outputs--levels of mortality, and with items of convenience (telephones). Such procedures confuse attempts to compare results or replicate the studies in other cultural and economic contexts.

Demographic Indices of Development

Indicator Requirements

In the search to develop a social indicator capable of measuring the impact of development processes in terms of meeting human needs, Morris devised and presented such a composite indicator in his book, Measuring the Condition of the World's Poor: The Physical Quality of Life Index, (1979). The index, which he labeled, the Physical Quality of Life Index or PQLI, was intended to meet a number of criteria which he suggested such a composite indicator should have. The six criteria he posited were: 1) the indicator should not assume that there is only one pattern of development; 2) it should avoid standards that reflect the values of specific societies

(it should be unethnocentric); 3) it should measure results not inputs; 4) it should be able to reflect the distribution of results; 5) it should be simple to construct and easy to comprehend; 6) it should lend itself to international comparison (Morris, 1979, p. 21).

Morris' PQLI is a weighted composite of three indicators: 1) the infant mortality rate, 2) life expectancy at age one and 3) the literacy rate. The rationale and method of weighting and combining these three indicators will not be elaborated here but the criteria posited above are pertinent to the selection of mortality as the social indicator employed in this research.

Mortality as A Social Indicator

Mortality has been shown to be a sensitive indicator of the level and the distribution of the physical living conditions of a population (United Nations 1980) and it has gained wide acceptance because of its validity and simplicity (Williamson, 1987; Young et al., 1983). Although Morris presented a thorough discussion supporting his composite index, several considerations were involved in selecting mortality, specifically--life expectancy at birth, instead of the PQLI. One of the criteria was the same as that proposed by Morris under number 5 in the preceding discussion--that it should be simple to construct and easy to comprehend. The PQLI is a composite measure involving a weighting procedure of variables that are dissimilar: mortality levels and

literacy. Literacy is itself a variable which influences life expectancy and is therefore an "input" and redundant as a component of the index (Young et al., 1983; Larson and Wilford, 1979). As a weighted composite measure, comprehending and communicating the significance of PQLI requires understanding the procedures involved in its construction and accepting the arbitrary weighting of the dissimilar variables. Without knowledge of the nature of its construction, the PQLI alone is not a meaningful figure, whereas life expectancy, given as the average number of years of life expected at birth, is not a composite index and is in itself a meaningful and easily communicated value.

Determinants of Mortality

There is a multitude of interactive factors which affect mortality levels. Birdsall (1980) groups these factors into three categories. The first category includes public health services which affect mortality independently of the behavior of individuals (e.g., mosquito control programs which reduce malaria). The second group of factors are those health and environmental services which make better health conditions possible but require a response from the individual. For example, clean water or more health care facilities make better health possible but require a response in terms of utilization by the intended recipients of the services. The third set of factors includes those characteristics of the individual such as income, which enables the individual to

purchase better nutrition or housing, and education which enables individuals to better utilize the available means to improve their health conditions.

The interaction between mortality-influencing variables and their relative influence in reducing mortality, both historically in the developed countries and, more recently, in underdeveloped countries has been the subject of much debate. Considerable discussion centers around two perspectives, one emphasizing the role of technological advances in medicine and public health, and the other attributing the greater impact on mortality decline to improvements in standard of living (Woods, 1979). Research suggests the relative weight of the two sets of factors was different in the respective time frames of the onset of mortality level decline in the now developed nations and the underdeveloped areas of the world today. McKeown (1965) contends that standard of living variables were more important in the onset of mortality decline in the now developed countries from the mid-nineteenth century while Arriaga and Davis (1969) suggest the more recent decline in developing Latin American countries, at least until the 1960s, was more strongly associated with advances in medical technology. The steep rate of decline in mortality levels in underdeveloped countries after World War II slowed considerably in the late 1960s and early 1970s (Flegg, 1982; Gwatkin, 1980). Gwatkin's (1980) explanation is that while the improvements in medical

and public health facilities were effective in reducing certain types of diseases (malaria and smallpox, for example), other diseases such as diarrhoea, pneumonia and the effects of malnutrion are now of greater relative importance. These kinds of diseases are more related to environmental conditions influenced by family income rather than the number of physicians, for example (Gwatkin, 1980).

In a time-series study of the relationship between mortality and economic development, Preston (1975) concludes that rather than becoming progressively dissociated from income, mortality rates may now be more responsive to it in low-income countries. These studies indicate that the structure of mortality, or the patterns of disease observed as they affect mortality, change through time and vary according to the particular social, economic, and technological context. As the structure of mortality changes and the incidence of certain types of diseases is reduced or eliminated, the relative influence of the determinants of mortality changes as diminishing returns occur with respect to the 'cures' of specific diseases (Flegg, 1982).

In this investigation of mortality levels in Venezuela, determinants of mortality representing standard of living factors, public sanitation services, and personal characteristics are used as variables for analysis employing indirect demographic estimation techniques. The Brass-type indirect estimation techniques which utilize census sample

data permit the disaggregation of populations according to the spatial and social distribution of selected mortality factors. The determinants of mortality analyzed in this study were suggested in the preceding discussion of the relative influence of types of mortality factors. In general, the variables were chosen on the basis of: 1) prior research suggests they are significant determinants in developing countries, and 2) capability of obtaining data for the variable from the census sample. The determinants examined and the rationale for their selection are presented below.

Household income

Income has been demonstrated to be an important determinant of the level of mortality (Wood and Carvalho, 1988; Rodgers, 1979 and Preston, 1975). A family's financial resources has an obvious and direct relationship to its capacity to purchase health-related commodities and services, including better nutrition, quality of housing, medical care and items which permit the maintenance of personal and household hygiene. Income is strongly associated with other mortality factors such as education and housing quality but it is now possible to introduce controls by decomposing the population into subgroups by income categories for cross-comparisons.

Education

Education, particularly the educational level of the mother, has been widely noted as an important determinant of

lower mortality levels (Hobcraft et al., 1984; Young et al., 1983; Flegg, 1982; Caldwell and McDonald, 1981). On the basis of his analysis of Nigerian survey data, Caldwell (1979) makes a strong case for his conclusion that the level of "...maternal education is the single most significant determinant of these marked differentials in child mortality (p. 11)." He suggests three reasons for the importance of this factor. First, more educated mothers may be less "fatalistic" regarding illness and more likely to adopt many of the newer alternatives in child care and treatment of illness. Second, the educated mother's knowledge of medical facilties, how to communicate with health officials and manipulate the system is likely to be superior to the capacities of a less educated mother. The third reason suggested is that, with increasing level of education of women, the traditional balance of familial relationships are changed in ways which positively affect child care. Educational level is strongly associated with other variables such as income and stable employment which affect mortality but when Caldwell (1979) controlled for those factors, a strong independent effect remained. The importance of this mortality determinant is supported by evidence from both underdeveloped (Wood and Carvalho, 1988; Hobcraft et al., 1984; Flegg, 1982; Palloni, 1981) and developed countries (Caldwell, 1979).

Sanitation facilities and environmental risk

Infrastructural improvements which have an impact on mortality include provision of piped water from treatment plants and sewage networks. Piped water not only provides a safer water supply but it also facilitates personal hygiene and household cleanliness since the water does not have to be carried to the home. Modern sewage networks and treatment plants prevent contamination of water supplies in addition to removing wastes from the vicinity of homes. The association between accessibility to water and sewage facilities and reduced mortality has been demonstrated in Brazil (Merrick, 1985; Sawyer and Soares, 1982) and other developing countries (Hobcraft et al., 1984).

Urban versus rural residence

The importance of urban or rural residence as it influences mortality in today's underdeveloped nations reveals an interesting reversal compared to the historical situation of the now developed countries as they were going through the industrialization process. Analyses of mortality in the history of the now developed countries indicate that urban areas were markedly inferior compared to rural locations in the environmental conditions encountered which affected the health of the population. In his analysis of mortality in Britain, covering a time span from 1841 to 1922, Glass (1964) found as much as a 20-year advantage in life expectancy for some rural areas compared to certain cities in 1841 and the

rural areas still maintained as much as a five-year advantage in 1922. The rural-urban gap in the number of years of life expectancy narrowed in developing countries as an overall mortality reduction occurred until there is currently less than a half year's difference between populations in urban and rural areas in some European countries and the United States (Davis, 1973).

In developing countries today, the reverse is more often true; it has been the urban areas which have enjoyed a marked advantage in life expectancy over the rural areas (Behm, 1979). The imported technologies for reducing mortality were introduced earlier and are more available in the cities. Investment in medical facilities, water and sewage infrastructure is also more concentrated in the urban areas. Comparing rural and urban mortality in Brazil, Wood and Carvalho (1988) initially found no apparent pattern in observed differences. However, when the mortality rates were disaggregated for income levels, it was found that low-income persons in urban areas had a lower life expectancy than people of the same (monetary) income level in rural areas. The reverse was true for persons in the highest income category. These results suggest one of the problems of comparing incomes between urban and rural residents. Residents of both urban and rural areas with apparently the same income may actually have substantially different real incomes. The purchasing power of a given amount of money in urban areas may be lower

compared to the same amount of monetary income in rural locations because of higher prices in urban areas and the need to pay for additional goods and services which can be grown (such as food) or acquired in some other manner in rural locations. Problems associated with use of the income variable are discussed in more detail in Chapter IV.

Other mortality determinants

There are, of course, many other possible determinants of mortality in addition to the ones reviewed above. In particular, access to health care facilities and the number of available physicians in certain areas bear an obvious relationship to level of health care but unfortunately, because of data limitations, these variables cannot be included in this research. Information is available concerning the location and number of physicians and health care facilities (by state) but unfortunately, it cannot be matched in a quantifiable manner with the household census sample survey information used in this research and therefore are not included for cross-comparisons of life expectancy or the Trussell-Preston regression analysis. Differences in access to health care facilities and physicians is an important variable and, to some extent, any observed urban-rural mortality differentials probably reflect those disparities.

Demography and Sociospatial Expressions of Development Disparities: A Summary

The utility of mortality as a summary indicator of the life conditions of a population could not have been fully realized without the availability of the Brass technique of indirect mortality estimation. The capability of deriving these estimates from census sample survey information for individuals and households permits disaggregated mortality estimates for population groups specified by any selected social or spatial criteria. Considerable flexibility is added to research in population geography and spatial analyses of development because geographic information is one of the types of variables attached to the individual record in census survey samples. Chapter IV provides a complete description of the techniques involved and their application.

This chapter has summarized salient features of leading development paradigms and their conceptualization of the causes and processes of social and spatial disparities in development. As we have seen, the scale of focus used by theorists of different schools of thought ranges from the nation-state level in the modernization school, to the dependency theorists' emphasis on extra-national influences affecting peripheral nations, to the global view employed by the world-systems perspective. Regional science and microeconomic theorists approach subnational level development

analyses with similar research tools employed at the national or macro-level by the orthodox analysts.

Underlying tensions between the paradigms was reflected in the "growth versus distribution" debate. Eventually, concern for distribution crossed philosophical barriers from radical theorists to be incorporated to varying degrees into the "growth-with-equity" perspective which retains a more conventional economic approach to development. The "basic needs" or "human needs" issue became a fundamental part of the discourse regarding development (Hopkins and Van Der Hoeven, 1983).

It has been pointed out that the actual outcomes of global, national, and subnational processes frequently differ from the theoretical predictions of a certain paradigm according to the context of a specific nation (Dicken, 1986; Kim, 1986; Wilber and Jameson, 1984; Streeten, 1984; Morris, 1979; Nugent and Yotopoulos, 1979). As David Apter (1987 p.35) notes, "The point is that in both Third World and advanced industrial countries, the productive system and world economy are changing in ways that confound conventional liberal modernization and dependency theorists. Authors from a diverse range of research objectives and perspectives on development have stressed the importance of analyses of "concrete" development experiences (Wood, 1988; Dicken, 1986; Kim, 1986; King, 1986; Turner, 1986; Cole, 1981; Brown and Gilliard, 1981). The need to derive empirical evidence from

processes of social and economic change in specific settings is reflected in Morris'(1979) comment, "....it is important to stress the differentness, the diversity, among developing countries because the diversity of experiences can lead to new theories about development evolution and about the measurement of welfare performance (p. 22)."

A method of assessing the outcomes of specific development experiences has become more critical, not only in terms of empirical verification of theoretical constructs, but as a means of evaluating national and international development strategies. As the issue of basic human needs came to the fore, a means of measuring development performance in terms reflecting those criteria was sought. The significance of the interaction between material dimensions of development and demographic variables was emphasized and is the basis of the rationale for this study.

Mortality levels are posited as an useful indicator to summarize the outcomes of different development contexts and processes in terms of their impact on the well-being of the population. Certainly not all dimensions of development are captured by mortality rates, nor can they be by any other indicator yet devised. They do, however, permit important insights into the level material well-being and its distribution which GNP and other production or consumption measures do not offer. The utility of the indicator combined with the development of the Brass-type mortality estimation

techniques provides the researcher with a flexible tool to derive mortality estimates and compare them internationally, regionally, and through time.

The review of development paradigms in this chapter underscores the necessity to place the analysis of the conditions in a specific nation within the context of the forces and processes which have been operative at the international, national and subnational levels. The following chapter will outline the geographic, economic, political and social features and processes which have shaped the development of a particular nation--Venezuela. The specific style of development and the rapid pace in which the profound changes have occurred in Venezuela are among the reasons it was selected for analysis in this research. The discussion describes the way in which various forces and events coincided with internal processes in Venezuela to produce the living conditions of the population which are the subject of this research using recently available demographic research tools.

CHAPTER III
DEVELOPMENT IN VENEZUELA

Introduction

The previous chapter reviewed the leading perspectives on development and suggested the need for more analyses of concrete development experiences. This chapter places the investigation in the specific national setting, beginning with a description of the geographic context, emphasizing the particular regional characteristics which are important to understanding the life conditions found in different parts of the country. Next, the broader aspects of Venezuela's political, social and economic transformation are reviewed. Attention is directed to those changes which have taken place in recent decades under democratic administrations and their programs of large-scale government planning and participation in the nation's economy. The impact of those changes on the structural determinants of mortality is stressed.

Geography and the Spatial Economy

General Description

Venezuela is seventh in physical size among Latin American nations with about 352,000 square miles of area, roughly equivalent to the size of Texas and Oklahoma combined.

It is sixth in population with 14,516,735 inhabitants (excluding about 53,000 indigenous persons not surveyed) according to the 1981 census and is one of the hemisphere's least densely populated countries. Population distribution is highly uneven, with most of the nation's people inhabiting the northern part of the country near the coast, in the coastal mountains or in the Andes. The rest of the country including the Llanos, the Orinoco delta and, particularly the Guayana Highlands, is very sparsely inhabited. Located entirely within the tropics on the north coast of South America, Venezuela's 1,750 mile long coast forms much of the southern shore of the Caribbean Sea and has an Atlantic coastline as well. It is wedged between Colombia on the western and southwestern border, Brazil on the southern and southeastern border and Guyana in the east.

Geographic Diversity

Venezuela's extreme physical diversity suggests division into a number of regions, each with distinctive physiographic, climatic, cultural and economic features. Different authors have at times divided the nation into four or more regions, but at least four areas are so distinctive as to appear in nearly all classification schemes: the north coastal zone of mountains, the Andes, the Llanos and the Guayana highlands. The Maracaibo Lake basin and the Orinoco delta, distinctive physical features in their own right, are sometimes considered as separate regions.

The dominant physical feature of the western part of the country is the Andes mountain range, a spur of the chain which extends the entire length of the South American continent. The range enters Venezuela in the west from the Colombian border, turns northeast and divides to form the Lake Maracaibo basin (see Fig. III-1). It diminishes in size as it extends toward the northern coast until it gradually falls off into the Caribbean. East of the remnant of the Andes range, another chain of lower mountains referred to as the Coastal Range or Central Highlands follows the north coast. It discontinues briefly at the Unare depression and resumes again to finally terminate on the coast near the island of Trinidad, which is actually an extension of the range. Between the coastal range and the Andes and extending north toward the coast are the Segovia Highlands, a transition zone of low mountains and hills. South of the Coastal Range and southeast of the Andes is a broad, grass-covered plain, known as the Llanos that extends from the Colombian border with southwestern Venezuela to the Orinoco Delta in the east. The Llanos are bordered on the north and northwest by the Coastal Range and the Andes and on the south by the Orinoco River which also forms the border with the Guayana highlands. The Guayana Highlands and theLlanos drain into the Orinoco, the second largest river in South America and fourth largest in the world in volume of discharge. The largest and one of the most distinctive physical features of Venezuela, the Guayana

Fig. III-1. Physical Regions of Venezuela

Highlands, form one of the world's most spectacular landscapes with vertical-sided, flat-topped mesas often rising several thousand feet above the tropical forests or savannas below. This sparsely populated and barely explored region comprises nearly half the national territory of Venezuela.

These physiographic divisions form the backdrop for the evolution of regional identities which are as distinct in their particular economic and cultural characteristics as they are in their physical features. Each has played a particular role in the nation's history according to the time and circumstances. An adequate description of the rich physical, historical and cultural variety which comprises the nation of Venezuela cannot be presented in this chapter. However, a brief summary of the distinctive regional contexts of the national territory is necessary to understand the relationships between the life conditions of the population and demographic measures reflecting those conditions.

Origins of the Spatial Economy: Early Settlement Patterns

Although the site where Columbus first landed on continental America in 1498 is within present-day Venezuelan territory, the colony remained essentially a frontier area of the Spanish Empire until independence. The Crown's attention was focused on other areas including Peru and Mexico which were more richly endowed with those resources suitable to the period, the technology and economic structure of the Spanish Empire, i.e.: gold and Indians. The vast resources which are

the object of so much attention in twentieth-century Venezuela were either not known to exist, or were of comparatively little value at the time of discovery by Europeans and throughout the colonial period.

It was during the earliest years of colonization that the foundations of Venezuela's latter patterns of urban growth and regional social and economic structure were established. The earliest settlements were founded in the east--Nueva Cadiz and Cubagua in 1510, and Cumana in 1523, to exploit the pearl fisheries around Margarita Island and the nearby salt deposits on the mainland. Later Coro (1527), El Tocuyo (1545) and Maracaibo (1567) were settled in the west to conduct slave trading and produce some agricultural commodities. In 1555, Valencia was founded in one of the intermontane basins of the Central Highlands which would later become the center of the nation's leading agricultural area and most populated region. Caracas was founded in 1567 in the same Central Highlands region near the coast to link the eastern and western coastal settlements. The city has a more attractive climate than the other early settlements and it was selected as the central defense position along the coast by the Spanish military because of its defensible position. Later, Caracas was also chosen as the Spanish regional administrative center and the city soon began to establish its leadership as the principal urban center of the colony. Today, Caracas, Maracaibo and Valencia are, in order, Venezuela's three largest cities. By

the end of the sixteenth century nearly all of Venezuela's current major urban centers had been established, setting the location and structure of urbanization which would persist and even strengthen through the centuries and throughout the profound social and economic changes Venezuela would experience in recent decades.

Major Regions of Venezuela

The country's pronounced physical differences soon began to be reflected in the distinctive social and economic characteristics of the settlements. The physical setting provided the conditions and the limits under which the local economies and social structures would evolve and, in different time periods would influence the position that a region would hold in national affairs. Regional distinctions and loyalties have always played a significant role in the internal political and military strife which characterized much of Venezuela's history. and the living conditions of the populations residing in these areas have always been profoundly affected by the region's combination of environment, resources and social characteristics.

North Central Venezuela

North Central Venezuela is the most urbanized part of the nation as well as the political and economic center of Venezuela. The area contains the capital and largest city, Caracas, as well as the nation's main industrial corridor and largest airport. Located largely in the mountains of the

western section of the Coastal Range, the region includes roughly the states of Miranda, Aragua, Carabobo, the Federal District and part of Yaracuy (Fig. III-2). According to the 1981 census, this urban-industrial core includes three of the five largest cities of Venezuela: Caracas (pop. metro area: 2.6 million), Valencia (616,000), and Maracay (440,000) and over 5,446,000 people, or 37.5 percent of the nation's population.

The attractiveness of the central valleys in this region was known from the earliest days of Spanish exploration (Lombardi, 1982) and the area achieved economic prominence early in the colony's history. Cacao thrived and was produced almost exclusively in plantations of the valleys and basins of the Coastal Range (Margolies 1979). The colony's economy was dominated by cacao production for more than two centuries until it was superceded by coffee around 1830 after theIndependence War and the confiscation of plantations which disrupted trade with Spain.

Founded on the production and export of cacao, the position of North Central Venezuela as the metropolitan core of the nation and the role of Caracas as the principal city were firmly established during this period. The dominance of the city was further enhanced as the dramatic economic and social changes of the current century took place. The size and the centralized function of Caracas in the nation's urban

Fig. III-2. States and Major Cities

hierarchy has given Venezuela the primate city feature so characteristic throughout Latin America.

Insofar as there has been substantial movement of population and industry to secondary cities, the trend toward reduction in urban primacy is more pronounced in Venezuela than other nations in Latin America (Jones, 1980, 1979; Brown and Gilliard, 1981). However, most of the growth in income, population and industrial activity in secondary cities is still concentrated in the industrial corridor adjacent to Caracas. The area is by far the most densely populated part of the country (OCEI, 1985) and it produces three quarters of the industrial value added (Blakemore and Smith, 1983).

The Andes

The Andes of Venezuela differ from the popular image of those mountains inspired by sections of the range located in countries further south characterized by high, cold and often desolate terrain with the remnants and ruins of a highly complex indigenous civilization. The branch of the Andes range located primarily in the Venezuelan states of Tachira, Merida and Trujillo is not nearly so high and cold and does not contain large numbers of the descendants of a former civilization speaking a language other than Spanish. Generally much lower in altitude, the Venezuelan Andes have a more generous vegetation cover and are suitable for cultivation of tropical crops in the valleys and temperate climate crops at higher elevations.

Although coffee production initially took place in the former cacao zones of the coastal mountain valleys, it was an ideal crop for the cooler mountains of the Andes. Cultivation spread into the states of Tachira, Merida and Trujillo and production increased until the Andes became the leading coffee producing area by the late nineteenth century. Coffee remained Venezuela's foremost export until around 1920 when petroleum production began.

The shift in the location of production and the growing importance of coffee as the leading export crop also attracted population to the region in response to the dynamism of the economy. By 1880, coffee had reached its highest level of production in the Andes and it was the primary source of foreign currency (Dipolo and Suarez, 1974). The prosperity which coffee brought to this part of Venezuela during this period caused it to become an area of attraction for migration (Cunill, 1984). Numerous commercial centers were established and prospered along with the coffee farmers and the region's population grew at nearly double the national rate from 1873 until 1926 (Margolies, 1979 and Roseberry, 1979 in Margolies, 1979). Population movement into the area was stimulated not only by the attraction of a prosperous economy but also by the healthful climate (Cunill, 1984). Many of the migrants came to the cooler mountainous area leaving the nearby low-lying Llanos region where malaria was virulent (Crist, 1983). The region and the coffee economy offered, according to Roseberry

(1983), "... a level of autonomy and standard of living that, despite growing debts, was better than that achieved by rural toilers in other parts of the country."

Several events, which occurred between 1925 and 1935, had profound impacts on the national economy and completely reversed the position of the Andean region in the nation's economy (Suarez and Dipolo, 1979), creating a depressed region and changing it into an area of population expulsion. The sudden increase in oil production that played a dominant role in all of Venezuela's affairs in this century was, of course, one of the elements, reducing the importance of agriculture in general, and generating high-paying jobs in the petroleum industry which was located nearby in Zulia state in the Maracaibo Lake basin. Other decisive blows to the region were caused by the worldwide economic crisis beginning in 1929 which drastically depressed the market for agricultural products (particularly those not essential to the diet) and by the Gomez' administration's revaluation of the currency to favor the import of capital goods. The policy did aid the importation of capital goods but disastrously affected agricultural exports by increasing the price on the international market (Roseberry, 1983; Suarez and Dipolo, 1979).

From the Gomez years until the present, the Andes have remained an area of outmigration and economic stagnation despite the efforts by the post-revolutionary governments to

concentrate much of the agrarian reform activity there (Eidt, 1975). In 1936, the states of Merida, Tachira, and Trujillo still contained about 19 percent of Venezuela's population, or about 638,000 people. By 1981, 1,533,330 people resided there, more than double the 1936 population but only about 10.6 percent of the nation's total. The population of the whole country had more than quadrupled in the same period (OCEI, 1985).

Agriculture was the foundation of Andean prosperity in the last century but to a greater extent than some of the other regions which have changed their economic base to manufacturing, services or raw material extraction, the Andes have remained a rural, agricultural society. Among Venezuela's regions, the Andes have the highest percentage of population living in rural areas and few major urban centers (OCEI, 1985 and 1981 public use sample). Only San Cristobal (198,000) and Merida (142,000) have more than 100,000 people. Exacerbated by soil erosion and exhaustion, the agricultural base of the Andes has continued to decline (Crist, 1984). As small farmers are pushed off the land, it is being bought by wealthy urban residents for vacation homes in the cool, scenic mountains, further changing the economic base of this once prosperous region of Venezuela.

The Llanos

The Llanos, the extensive grassy plains of Venezuela, are located in the states of Apure, Barinas, Portuguesa, Cojedes,

Guarico, Anzoategui and Monagas. There are over 2,539,000 people living in these states or, about 17.5 percent of the national population, although not all live in areas which are part of the Llanos. Population density is low and the inhabitants live mostly in rural areas or small towns, there being only two urban centers with more than 100,000 inhabitants in 1981: Barinas (pop. 110,000), in the state of Barinas, and Maturin (pop. 155,000), located at the eastern edge of the Llanos in Monagas State.

The Llanos have long been devoted to raising cattle and horses and, in the earliest years after Spain's colonization, hides were the major export from the area. In the area of the present-day state of Barinas, there were half a million head of cattle according to the 1787 census and the area was also famous for its tobacco. The Llanos enjoyed such prosperity during this period that poverty was said not to exist (Crist and Nissly, 1973). However, beginning in the nineteenth century, devastation from the Wars of Independence and the later Federal Wars became so widespread that many families migrated into the nearby Andes which was enjoying its period of economic ascendancy from the "coffee boom." Malaria also contributed to the economic and population decline of the Llanos to the extent that only in 1950 did Barinas state regain the population (about 80,000) it had in the last century.

Recent decades have seen a change in the situation as, at least in the western Llanos states of Barinas and Portuguesa, a significant inmigration to the area occurred (OCEI, 1985) partly as a result of government sponsored agrarian settlements, investment in infrastructure and improvements in health conditions (Jones, 1980). Raising livestock continues to be an important part of the Llanos' economy, as it has been for centuries, but a commercial agricultural economy is developing based on the production of rice, corn and sesame and assisted by the construction of irrigation, flood control and transportation facilities (Crist and Nissly, 1973).

The migratory relationship between the Andes and the Llanos reversed in recent decades, with the Llanos receiving population from the now depressed Andean region. The agrarian settlement programs, largely directed toward the Llanos in the early years of the program (Eidt, 1975), the eradication of malaria in the region and the decline of the Andean agricultural base have all contributed to the reversal (Crist, 1984).

Zulia

The state of Zulia, which is also designated as an administrative region, Zuliana, surrounds the Maracaibo Lake basin (about 5,000 square miles in area) and is the location of the vast petroleum deposits that have played a predominant role in Venezuela's history during this century. After 1920,

Zulia experienced a steady increase in population because of the labor requirements of the expanding oil production. Most of the population growth occurred in the state's leading city, Maracaibo, and the nearby towns, Cabimas, Lagunillas, and Ciudad Ojeda, where oil production and shipment points were located. Maracaibo grew rapidly and is still the second largest city in Venezuela (1981 pop. 888,000) after Caracas, and Zulia became and remains second only to the Federal District as the most populous state in Venezuela with 1,674,252 people, or 11.5 percent of the nation's population. The remainder of Zulia outside Maracaibo and the oil production area remains sparsely populated and predominantly rural in character with no other major urban centers.

After 1958, foreign investment in the oil industry stagnated as the petroleum companies became uneasy about what the aftermath of the revolution would bring (Blank, 1984). In spite of the high wage remuneration to workers in the oil industry, a pronounced decline in the share of national income was experienced by the region. Jones (1982) estimated that a decline from 17.7 percent in 1961 to 11.4 percent in 1967 occurred in the state's share of national gross territorial product.

As a consequence, the population of the petroleum-producing states, including Zulia, declined while unemployment increased in the formerly prosperous area (Jones, 1982). Since the start of production, Zulia had provided Venezuela

with three fourths of its oil revenue, yet by the early 1960s, it was in a severe economic depression because of the disinvestment (Blank, 1984).

Guayana

The region known as Guayana covers nearly half the national territory (46 percent) and includes the whole of the State of Bolivar, the Amazonas Federal Territory and the Orinoco Delta Territory. A wide variety and vast quantities of minerals including iron ore, bauxite, manganese, diamonds and gold are located here. Much of the nation's more than two billion tons of proven iron ore reserves (greater than 55 percent purity) is located in Guayana and there are over 200,000,000 tons of high quality bauxite in just one of the major deposits in Bolivar state (Cunill, 1987).

The region became the focus of the first and largest regional development and planning project after the revolution with the establishment of new industrial complex in the planned regional center at Ciudad Guayana. The new city was intended to become the nation's principal heavy industry center (Friedmann, 1966, p. 157). Some of the area's hydroelectric potential was harnessed by the construction of the Leoni dam on the Caroni River, an integrated steel mill and hydroelectric plant and an aluminum production plant.

In addition to establishing a heavy industry complex, the goal of the project was to create a new regional economy in largely unsettled territory as part of an overall national

policy for decentralizing economic development. Founded where there was only a small village in 1958, the new Ciudad Guayana center did, in fact, grow rapidly and in 1981 had more than 314,000 people. Contrary to the planners' intentions, the growth came largely from the surrounding areas within or near the region rather than from other parts of the country and did not serve to relieve the pressure on urban centers in other parts of Venezuela.

Within Guayana, sharp contrasts exist between urban and rural areas and characteristics. In Bolivar State, over 495,000 of the 668,000 people live in the two metropolitan centers, Ciudad Guayana (pop. 314,000) and Ciudad Bolivar (pop. 181,000), leaving the remainder of Venezuela's largest state nearly uninhabited. Only 46,000 people live in the region's huge Amazonas Territory. Because of the concentration of people around the industrial complex, the residential and occupational characteristics of Guayana's population is highly urban and industrial, although most of the region's area is very sparsely inhabited by indigenous people.

The administrative regions

For administrative and planning purposes, the national planning agencies and the census office divide the country into nine regional subdivisions (CORDIPLAN, 1981 and OCEI, 1985 p. LXIV) (see Fig. III-3). Some of the administrative divisions correspond roughly to the major physical-cultural

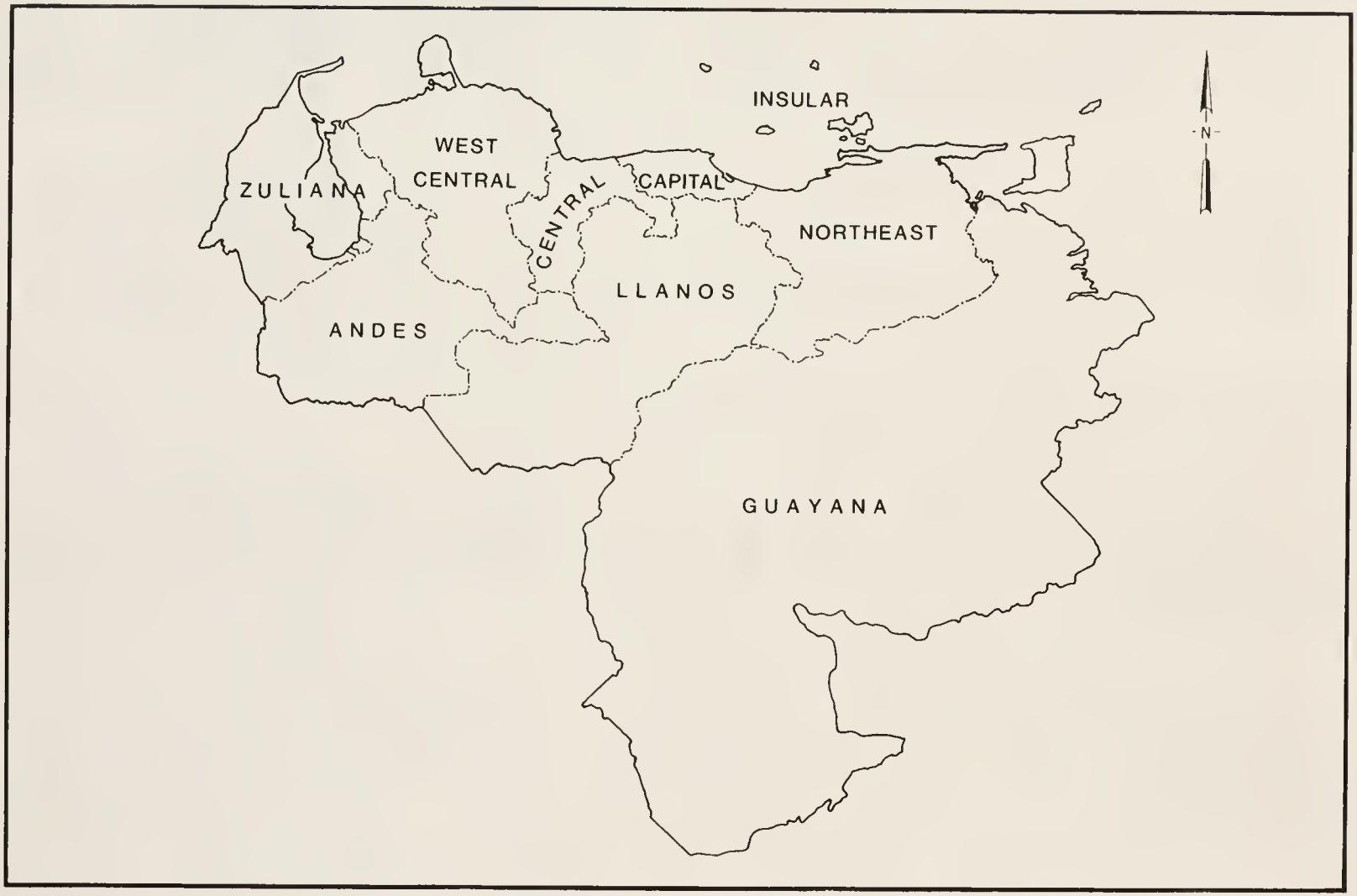

Fig. III-3. Administrative Regions of Venezuela

regions described earlier. The Insular region is excluded from the analysis because of its small population. The region includes a number of small islands along the Venezuelan coastand the state of Nueva Esparta, which is essentially only Margarita Island. The administrative regions are used as the territorial units in the spatial demographic analyses conducted in this study and they comprise the following states:

Region: States or Territories

1. Capital Region: Federal District and Miranda
2. Central Region: Aragua, Carabobo and Cojedes
3. West-Central Region: Falcon, Lara, Portuguesa and Yaracuy
4. Guayana Region: Bolivar and Federal Territories Amazonas and Delta Amacuro
5. Insular Region: Nueva Esparta and Federal Dependencies
6. Andes Region: Barinas, Merida, Tachira, Trujillo and Paez district of Apure state
7. Llanos Region: Guarico and Apure (less Paez district)
8. Northeast Region: Anzoategui, Monagas and Sucre
9. Zuliana Region: Zulia

Geographically, there might be some exceptions taken to the administrative regional groupings of the states and territories. For example, most of Barinas, Portuguesa, Anzoategui and Monagas states are located in territory which

is physically part of the Llanos although they are not included in the Llanos planning region. In the census regional grouping scheme they have been included with other states of different physical and agricultural character. However, to maintain consistency, the national regional system is used in this research rather than creating another grouping of states.

The preceding discussion presented a picture of Venezuela's geographic diversity and summarized prominent features of regional social and economic characteristics. The discussion now turns to the political, economic and social processes of change which have so deeply affected Venezuela in this century, with particular emphasis on the last three decades. We begin with petroleum because it has been the pre-eminent influence on Venezuelan national life (Blank, 1984).

Petroleum and the Economic Transformation of Venezuela

The Early Stages

The impact of petroleum on Venezuela's economy, politics, society and population caused a series of rapid and profound changes which Lombardi (1982, p. 211) termed "a compression of historical time and acceleration of cause and effect that stuns the observer." In 1920, Venezuela produced only 490,000 barrels of oil (Lombardi, 1982, p. 331). By 1945, production was over 321 million barrels and the country became the world's largest exporter and the second largest producer

(exceeded only by the United States). Production would later reach over a billion barrels a year during the 1960s and early 1970s.

During the Juan Vicente Gomez regime from 1908 to 1935, it was estimated that Venezuela received only seven percent of the profits the foreign companies extracted from oil production in the country (Blank, 1984). Under the elected governments in recent decades, petroleum revenues have increased enormously, first as larger concessions from foreign oil companies were negotiated, then as major price increases occurred after the 1974 Middle East embargo and finally, when the industry was nationalized by the government in 1976. Among oil exporting nations, Venezuela has been the leader in negotiating larger shares of petroleum revenues from the oil companies (Hassan, 1975). In 1946, the government's share was the first among those nations to be increased to 50 percent, it was raised to 75 percent in 1970, and finally to about 85 percent in 1973 (Hassan, 1975) before nationalization of the industry. The increased revenues made possible federal funding of ever larger programs and national autonomous agencies intended to promote national and regional development (Greenwood, 1984 and Jones, 1982).

For much of the history of oil exploitation in Venezuela, most of the activity was carried out by foreign oil companies. Initially, the Dutch and British companies dominated production but they were later surpassed by a Standard Oil

subsidiary. During the earlier stages of its foreign ownership, the petroleum industry operated in enclaves, reconstructing for their employees as much as possible the lifestyles of Holland, Britain and the United States (Blank, 1984).

In time, the petroleum extraction enclaves, because of the complexities of the industry and the exigencies placed upon the host country, caused changes that were fundamentally different from foreign enclaves operating in other countries where agricultural production or the simpler extraction of other resources for export was the basis of the foreign component of the economy. The type and level of services required by the petroleum industry were more sophisticated than those needed for the cultivation and export of cacao or coffee (Lombardi, 1982) and the oil camp enclaves could not supply all of their own needs locally.

As petroleum production was extended over ever greater areas, especially after the reserves in the eastern part of the country had been discovered, the requirement for modern and extensive infrastructural improvements became apparent. Nationwide communications and transportation networks and reliable electrical service were not easily supplied by or limited to the enclaves. The technological elite of Venezuelan society who were the intermediaries between the petroleum industry and the surrounding rural society became anxious to reproduce in Venezuela some of the amenities of

health, transportation and communication which they observed and were supplying to the enclaves (Lombardi, 1982).

Transportation was particularly affected because of the locations of the new resources--petroleum, iron ore, bauxite and hydroelectric power at the periphery of the pre-existing economically active centers, areas called "resource frontiers" by Jones (1980). With unlimited petroleum resources available to construct and operate a petroleum-based transportation system, the government set about to create a road network unmatched in Latin America and nearly all of the outlying areas came within easy reach of the metropolitan centers (Lombardi, 1982). Consequently, few areas remained outside of the influence of the changes which were so rapidly occurring in the nation's urban centers, particularly Caracas.

Dependency

Concepts of dependency posited by both dependency theorists and orthodox economists apply to Venezuela. From the dependency perspective, it is a highly dependent nation because of the export-oriented economy and the strong influences of the North Atlantic nations in all phases of its political, cultural and economic existence.

A traditional economic definition of dependence is also appropriate because of the single-product, export-orientation which has historically characterized the nation's economy. The export dependence was first based on cacao production, then coffee and currently--petroleum. In 1979, petroleum

accounted for 95 percent of Venezuela's export earnings (Lombardi, 1982, Table III-8) and in 1981 the revenues from petroleum provided 76.5 percent of the government income (Ewell, 1984 p.229). The shift from dependence on agricultural exports to petroleum did not make the country less dependent, even after the industry had been nationalized. In 1980, the Inter-American Development Bank ranked Venezuela as the fifth most dependent economy among twenty-three Latin American and Caribbean nations using a measure produced by the ratio between the combined value of exports and imports and the Gross Domestic Product (Ewell, 1984).

Heavy dependence on a single product obviously places the country's economy in a vulnerable position in terms of the world's supply and demand for the product. Nevertheless, reliance on the production of petroleum has placed Venezuela in a better position than most other developing countries because both the price and quantity of petroleum exported has generally been far more stable than those of other primary products (Hassan, 1975). Although there was a sudden upturn in prices in 1974 and a downward trend in the early 1980s, there is a finite supply of the product for which there is little possibility of substitution at this time. In the long run, there will probably be a continuing appreciation in value (recent years notwithstanding). Finally, unlike coffee, bananas and tea, which are more dispensable products, petroleum is essential for energy and as the raw material for

the manufacture of numerous products in developed and developing nations alike. For these reasons, petroleum production creates, in certain ways, a different relationship to the world market and other nations than the situation of other developing nations dependent on the export of tropical agricultural products.

Emergence of a New Venezuelan Social Structure

The new technocratic and managerial elite

The installation of elected governments after 1958 imbued with ideals of large-scale national development programs financed by petroleum revenues also created an even greater need for a technically competent middle class to implement the far-reaching development plans of the nation and especially to provide the expertise required in the technologically sophisticated industries which generate most of the output of the Venezuelan economy. After nationalization in 1976, the requirements of technological competence and precision by Venezuelan managers and technicians associated with the petroleum industry and the newer, nationally-owned steel and aluminum industries became even more acute.

A combination of approaches was used to satisfy the rapidly growing need for skilled managers and technicians. Foreign technicians in large numbers were brought into the country in every phase of activity ranging from teaching to planning. The Ciudad Guayana project was an example of an international joint project in planning and developing a

completely new urban-industrial complex (Rodwin, 1970). Simultaneously, the national government embarked on a program to drastically increase school enrollment within the country (Ruscoe,1977 in Martz and Myers) and financed technical training and university level education of thousands of its citizens abroad with the generous scholarship program, Gran Mariscal Ayacucho.

Venezuelan social structure was rearranged and redefined by the creation of a large, middle-level technological and managerial class responsible for industries bringing billions of dollars into the Venezuelan economy without directly threatening the established elites (Tugwell, 1977). A relative decline occurred in the influence of the landed elite through displacement rather than revolution as many families became aware that although stock-raising and agricultural estates (the old bases of wealth and power) remained valuable, their relative importance was drastically reduced (Lombardi, 1982). Some families responded by moving to the expanding centers of economic power, especially Caracas, and becoming members of the growing class of professionals, bureaucrats and businessmen (Roseberry, 1983).

In the new high-technology industries there was less latitude for the traditional system of personal connections to operate as the main criteria for obtaining key managerial positions. Elements of the traditional style persisted, however, in other sectors of the economy and agencies of the

government and has been responsible for much corruption, inefficiency and incompetence (Stewart, 1977). Through what David Blank called "creative corruption" as well as mismanagement, Venezuela was prevented from buying its way into modernity with the $50 billion "petrobonanza" it received from the post-1973 oil crisis (Blank, 1984).

Structural change and remuneration to the work force

It was suggested earlier that, whatever the benefits of the petroleum bonanza to the nation as a whole, the distribution of those benefits have been highly unequal, both "vertically" and "horizontally," that is, between social classes and between areas of the country. The impacts of the economic changes on the countriy's regions and the populations of those areas were spatial manifestations of changes in the structure of the Venezuelan economy. Areas were affected according to their particular combination of resources, economic specialization and position in the urban hierachy.

A closer look at economic activities, comparing remuneration per worker by sector for selected years between 1960 and 1972, reveals something of the extent as well as some of the reasons for substantial income distribution inequities between segments of the population and between areas of the country. Compared to agricultural workers, those employed in industry generally received three to four times the wage amount, workers in trade, about six times and petroleum workers, up to seventeen times the amount of income (Table

3.1). The higher paying industrial and trade activities are concentrated in the larger urban centers and particularly in the urban industrial corridor of North Central Venezuela.

Table 3. 1
Average Annual Remuneration per Worker by Economic Sector*

	1960	1965	1970	1972
Agriculture	1,556	2,084	2,361	2,067
Petroleum	25,659	34,563	25,701	27,391
Industry	6,170	6,734	6,999	7,896
Trade	8,730	7,070	11,657	12,370

* bolivares
Source: Ewell, 1984, Venezuela: A Century of Change, p. 183.

The work force employed in petroleum industry has an impact in the national economy greatly exceeding its proportion in numbers. In 1975, employees in petroleum and mining which comprise only 1.3 percent of the labor force generated 29 percent of the Gross National Product and provided the central government with 77 percent of its revenue (Valente, 1979). The level of skills required and the high productivity of the labor force in this sector, in terms of the value of the product, gives employees considerable capacity to press their demands for their share of the industry's output.

During the years of rapid expansion of the economy, the relative importance of the economic sectors changed, not only in value added to the economy, but also in terms of the number of people employed. The tertiary sector of the economy shows an almost continual increase from 1950 to 1981 from 32.2

percent to 51.2 percent of the labor force while the primary sector declined drastically from 43.2 percent to 12.4 percent in the same period (OCEI, 1985). The shift in activity from an agricultural economy to a petroleum, manufacturing and service economy was reflected in the population movement to urban areas where the new activities were located.

According to the Venezuelan National Economic Council, the 10 percent of the population in the highest income category received 40 percent of the benefits from the petroleum industry in 1976, the next 40 percent of the population obtained 40 percent and the remaining 50 percent of the population, only 20 percent (Valente, 1979). The growth of a large, salaried middle class somewhat reduced the uneven income distribution at the top levels compared to other Latin American countries, but the poorest have received little benefit from the changes in economic structure (Valente, 1979). In 1970, the lowest 20 percent of the household income groups received only 3 percent of the total income, while the highest 20 percent received 54 percent (Wilkie, 1985, p.278).

Transformation of the Economy and "State Capitalism"

The impact of petroleum combined with political changes to create Venezuela almost anew. The 27-year Gomez dictatorial rule which ended with his death in 1936 had virtually eliminated all political parties, activity or even discussion and the country's potential leaders had all been jailed or exiled (Lombardi, 1982). Gomez had managed the

country as his own nineteenth century patriarchial rural hacienda (Crist, 1983). After his death, there was a vacuum of expertise and leadership in economics and politics and the country was reconstructed and re-organized under the direction of leaders who had returned from exile with a North Atlantic and international perspective of development and political institutions (Lombardi, 1982). Gomez' elimination of authentic Venezuelan political traditions made possible at the end of his regime, the wholesale importation of current international ideas with the return of the exiles to create a new Venezuela (Crist, 1983 and Lombardi, 1982). Revenues from the huge petroleum reserves would provide the mechanism that, in the view of the new leaders, would make this possible. Their ambition to create a replica of the North Atlantic societies was seen as a means of freeing the country from dependency by becoming as developed as those countries (Lombardi, 1982). With the oil bonanza, it was felt that the transition could be made without denying any segment of Venezuelan society a share of the new prosperity although there was considerable disagreement about the relative benefits obtained (Lombardi, 1982).

Before the ideas of the returning exiles could be fully implemented however, there was a series of post-Gomez military regimes which ruled the country until 1958 when the last military dictator, Perez-Jimenez was deposed. Venezuelan social and economic structures were already in a process of

rapid change, however, and the extent of those changes which had occurred during these years was such that Lombardi (1982) contends the downfall of Jimenez could be attributed to his failure to understand the new society and culture which he attempted to rule in the personal fashion of the old-style Latin American dictator. The capricious, irrational style of his rule offended the values of broad segments of Venezuelan society including the middle class, the technologically-oriented elite and the military which also turned against the regime, assuring his downfall (Blank, 1984 and Lombardi, 1982).

After the revolution, the new leaders, especially from the social-democratic oriented party, Accion Democratica, began to implement their principles for the new Venezuelan political and economic structure. These included state participation and planning of the economy, a wide-ranging program of social services and national ownership of critical productive sectors of the economy--particularly petroleum and metals production.

Ever greater concessions from the petroleum companies were negotiated until the industry was finally nationalized in 1976. The iron industry had already been nationalized in 1975. State companies were created at a rapid rate so that, by 1975, they accounted for 62 percent of public expenditures and spent twenty-five times more money than they had in 1960 (Ewell, 1984). The percentage of public expenditures

consumed by the central government had been reduced from 54 percent to 21 percent of the total even though four times the total amount of money was being spent by the government as in 1960. By 1980, there were 146 mixed public and private enterprises, of which 79 were wholly state owned (Ewell, 1984).

Social and Spatial Inequities and National Policies

Regional Planning and Development

Centralized economy and government

Along with increased state participation in and direction of the economy came the necessity to consider the spatial organization of the government's activities in those areas. Prior to 1958, the policies of the military regimes assured and reinforced the economic and political primacy of Caracas. Under the Perez-Jimenez government, 70 per cent of the national budget was spent in Caracas while only 30 per cent was spent in the interior, a ratio Betancourt, upon his entry into office, publicly stated he would reverse (Myers, 1977).

Caracas plays a dominant role in a very centralized national government whose ownership and control of key sectors of the economy gives it an important role in the nation's resource allocation. Greenwood (1984) notes that the centralized nature of the management of the petroleum revenues created the extensive state apparatus located in Caracas and the city itself rapidly grew to be the nation's primary

market. Efforts to industrialize through import substitution led to intensive concentration of new industries in the Caracas Metropolitan Area until saturation was reached in the early 1970s and the government finally decreed a moratorium on all new plants in Caracas in its "politica de desconcentracion industrial" in 1974 (Jones, 1979).

The highly centralized nature of Venezuelan government and the focus on Caracas as the decision-making center is reflected in the relatively weak functions of state and municipal governments. Stewart (1977) comments that, "...all decisions, whether important or not, are usually made in Caracas." He further describes the problem of centralization as being a problem of concentration of authority in nearly all Venezuelan agencies rather than just the physical centralization of the bureaucracies.

In the national government, the centralized and authoritarian leadership pattern constitutes what Schuyler (1980) calls the "presidentialist system." The necessity for the personal attention of the president, or the head of any other organization, in order to obtain any binding decision means that industries located too far from the power and money of Caracas are severely disadvantaged. This style of decision-making has tended to counteract official national policies intended to reverse the processes of centralization.

Spatial planning

Efforts to decentralize growth in Venezuela through national planning began after the fall of the Jimenez dictatorship in 1958 and with the establishment of the elected national government. The Betancourt administration created CORDIPLAN, the centralized office of coordination and planning, under the office of the presidency to provide the nation with an organization through which national goals could be formulated, long-range planning could be conducted and the activities of other agencies could be coordinated (Greenwood, 1984 and CORDIPLAN, 1981). Initially, CORDIPLAN produced a series of national plans primarily emphasizing sectoral components of the nation's economic development. By 1967, a department was set up within CORDIPLAN to coordinate regional economic development and the impetus toward formal spatial components of national planning continued, culminating in 1981 with the Sixth National Plan (1981-1985) which was the first to include regional investment plans for the administrative regions of Venezuela (CORDIPLAN, 1981).

The forerunner of regional planning in Venezuela was initiated by the first elected administration when it established the first government semi-autonomous regional development corporation, Corporacion Venezolana Guayana (CVG) for the development of the Guayana region, contracted with the Israeli government for technical assistance in new agrarian settlement planning and invested heavily in public works

projects in Venezuela's economically depressed areas (Jones, 1982; Eidt, 1975 and Friedmann, 1966). These programs were intended to utilize the resources of the peripheral areas of the nation, slow the growth of Caracas and reduce the substantial interregional disparities in income and employment opportunities (Greenwood, 1984 and Jones, 1982).

CVG, was one of the more successful of Venezuela's development organizations, not only in terms of planning objectives, but also as one of the most effective of the bureaucratic structures of the Venezuelan government (Greenwood, 1984; Stewart, 1977 and Rodwin, 1970). Experiences with the CVG spurred the interest of people from other regions of the country in the establishment of similar planning organizations. Consequently, in 1964, additional regional planning agencies were established in the Andes (CORPOANDES), in Zulia (CONZUPLAN), the West-Central region, (FUDECO) and later in the Northeast (CORPOCCIDENTE). With the creation of these regional agencies and the integration of their functions with CORDIPLAN, regional planning became an integral part of the government's involvement in the national economic structure.

Public Health, Housing and Sanitation

After 1958, substantial efforts were made, at least initially, by the elected governments beginning with the Betancourt administration to improve conditions in rural areas as well as among the poor population of the cities. In

addition to the agrarian reform programs, improvement and expansion of services including education, public health, water supplies, electricity, housing, child care and nutrition became priorities of the national government (Ewell, 1984).

An early public health priority of the post-revolutionary government was the elimination of malaria. Malaria which had been responsible for a large number of deaths, especially in the Llanos, was greatly reduced by an eradication program begun in 1946-47, during the brief period of democratic rule. The programs were resumed with considerable success after 1958 and malaria was virtually eliminated from Venezuela.

Another important element of the government's program to improve the health of the population was the provision of public housing. In rural areas, public housing had an additional impact on the health of the population because the host of the Chagas disease lived in the thatched roofs of rural homes (Ewell, 1984). In connection with the construction of water and sewage networks, public housing with piped water and waste disposal facilities reduced the incidence of water-born diseases. The percentage of homes provided with clean water (from treatment plants) rose from 46.7 percent in 1961 to 78.9 percent in 1981, while during the same period, housing units connected to sewer systems rose from 27.4 percent to 56.6 percent of the total (OCEI, 1985, p.CXI and CX). The number of homes without any waste disposal facilities at all declined from 37.7 percent to 16.3 percent

in the same period (OCEI, 1985, p.CX). However, the percentage varied considerably between rural and urban areas, with 56 percent of the homes in rural areas having no facilities, while only 7 percent of the residences in urban areas between 100,000 and 500,000 inhabitants had no waste disposal (OCEI, 1985, p.952).

Social Security

The current social security system was put into effect in 1967 and provides full medical attention (preventive and curative) for insured employees and their dependents in the case of illness, maternity or accident; benefits for temporary disability, burial and marriage; and pensions for old age, permanent disability, and survivors (Valente, 1979). Social security coverage extends to all wage and salaried workers but only in designated geographical areas, usually the major population centers. It does not always apply to the rest of the state where the center is located. Extension of social security protection to new geographic areas, particularly to rural areas to cover agricultural workers, is part of the national development plans but progress has been slow (Valente, 1979).

Education

Education facilitates development through providing the skills necessary for a nation's economy to function, particularly when the type of production processes have been changing rapidly, as in the case of Venezuela. Education is

also a crucial element contributing to the quality of life of the population including its physical well-being through improving health practices and reducing infant and child mortality (Chapter II).

Each administration since the 1958 revolution has considered democratization of the school system as an important goal. The policies have focused heavily on expansion of enrollment as the means of achieving that end (Ruscoe, 1977). In terms of numbers at least, there was a dramatic improvement. Enrollment nearly tripled in less than two decades after the end of the dictatorship. The national government's expanded educational role was reflected in the increase in the percent of the national budget allocated to education from 13 percent in 1958 to about 25 percent in 1973. In thirty years, from 1950 to 1981, the literacy rate increased from 51 percent to 86 percent, which places Venezuela at a mid-point between the average literacy levels for developed and underdeveloped nations (OCEI, 1985). In spite of the dramatic increases in enrollment, budgets, and literacy, there are still social and geographic distributional disparities in the expanded system.

The inequities are partially attributable to the bureaucratic structure of responsibilities and available financial resources for the education system. Private schools continue to play an important role, but schooling has become progressively nationalized as the government's education

budget increased. Education has become much more a national public enterprise rather than a private or state or municipal activity, but the national system still favors urban areas and higher income groups (Ruscoe, 1977). The states have been left with the task of providing education in rural areas where the sparse population frequently means that there are only the one-teacher type schools (escuelas unitarias) available.

Ruscoe (1977) found substantial differences in quality between public and private and urban and rural schools. Private schools, which are generally higher in quality compared to the public schools, are also usually located in urban areas and tend to serve students from higher socio-economic groups. Public urban schools also generally outperform the public rural schools. This means that Venezuela's rural and poor population not only does not have the access to schools enjoyed by the urban and higher income groups but also that the quality of education in the schools to which they do have access is lower.

Geographic variation in the literacy rates reflects the differences in access to education between rural and urban areas. In 1981, of the total population living in urban areas larger than 2,500, the literacy rate was 90.4 percent, while in towns between 1000 and 2,500 inhabitants, the rate was 76.7 percent and, in rural areas, it was 63.8 percent (OCEI, 1985, p. 166). Differences between rural and urban educational opportunities are also apparent in the regional variations in

literacy. The Federal District and the states of Miranda, Aragua, Carabobo and Bolivar all have literacy rates higher than 88 percent, or 2 percent above the national rate.[1] These are also the most urbanized states. The most urbanized region--the Capital Region, consists of the Federal District and Miranda which have literacy rates of 94.5 percent and 91.6 percent, the first and second highest levels, respectively, among Venezuelan states (OCEI, 1985 p. 167). Conversely, the lowest levels of literacy are generally found in states with the larger percentages of the population in remote rural areas, reaching the lowest rate, 72.8 percent, in the Amazonas Federal Territory.

The effect of the democratic governments' push for expansion of education opportunities is evident in the age differences in literacy. Comparing groups by age, sex and urban-rural residence, the highest literacy rate in the country, 95.8 percent, is found among women in the 20 to 24-year age group residing in urban areas and the lowest, 16.8 percent, is found among women over 65 years of age residing in rural areas (OCEI, 1985, p.166). In spite of the pronounced differences in access to facilities and quality of education, the expansion of educational opportunities in recent decades is apparent.

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[1]The difference between the literacy rates for these states and the national rate is so small because they contain a high percentage of the nation's population.

Agricultural Problems, Rural Poverty and Agrarian Reform

Rural poverty in Venezuela is linked to a number of problems in the agricultural sector which have varied according to time and place. The earlier discussion of regional economic differences highlighted some of the conditions in rural areas specific to regions of the country. Some of the problems in the agricultural sector are common to other Latin American nations and have their roots in conditions created decades, and in some cases, centuries ago. Concentration of land ownership, dependence on foreign markets, periodic depression of the agricultural markets, rates of currency exchange and pronounced differences in income between economic sectors have all played a role in Venezuela's agricultural difficulties.

During the years of the Gomez dictatorship, the already concentrated pattern of land ownership intensified. In 1937, the year of his death, 78 percent of the surveyed land was owned by 4.4 percent of the owners and the other 22 percent of the land was held by the remaining 95.6 percent (Ewell, 1984). It was also during his rule that the rural vs urban dichotomy in social and economic conditions, so characteristic of Venezuela, began to be exacerbated by the impact of rapidly increasing petroleum production and its disastrous consequences for the country's agricultural sector. By the end of the 1930s, a number of important agricultural products including cotton, tobacco and rubber were no longer being

exported (Eidt, 1975). There were several mechanisms by which this occurred, some of which were previously mentioned in connection with the depression of the Andean economy.

Decline in farm production was partially attributable to the creation of numerous well-paying jobs directly by the petroleum industry or indirectly in the other support industries and services to provide support for over half the nation's work force (Eidt, 1975). Differences in remuneration for workers in agriculture compared to other economic sectors were sometimes phenomenal. The average annual remuneration for a worker in the petroleum industry was 25,659 bolivares in 1960 compared to 1,556 for an agricultural worker (see Table 3.1). For decades, agricultural workers have been leaving rural areas for the cities and higher paying jobs. In 1936, only 34.7 percent of the population lived in urban areas which are defined as population centers with more than 1,000 persons. By 1971, more than 77 percent lived in centers that size or larger and the percentage reached 84.1 percent at the time of the 1981 census (OCEI, 1985). At the same time, sufficient income was generated elsewhere in the economy to import much of the basic foodstuffs. By 1971, Venezuela was importing 46 percent of its food and the percentage rose to nearly 70 percent in 1979 (Ewell, 1984).

The problem of currency exchange rates also contributed to the difficulties of the small-scale producer in the agricultural sector. The Venezuelan currency unit, the

bolivar, had initially been revalued upward during the Gomez regime to favor the importation of capital goods (Blank, 1984). Backed by increasing revenues from petroleum, the bolivar to remained strong against other currencies.
From 1940 to 1959, the exchange rate was 3.4 bolivares to one US dollar and has remained between 4 and 5 bolivares to the dollar from 1960 until the devaluation in 1983, that followed the fall in world petroleum prices. While favorable to most of the country's consumers, the strength of the bolivar caused the price of Venezuelan agricultural products to remain comparatively high, both in the internal and international market further contributing to the tendency to import food (Roseberry, 1983 and Suarez and Dipolo, 1979).

These conditions, in combination with the political considerations of the Accion Democratica (AD) party and the Betancourt presidency, were responsible for the Agrarian Reform legislation enacted soon after his election in 1959. The AD party, which could be characterized as a socialist-populist party, comparable to the German Social Democratic party (Valente, 1979), had built its base of support in the rural areas and among agricultural workers during the years of dictatorship. Consequently, special emphasis was placed on the promise of land reform and the party's victory in the first election was largely due to the strong support of its rural constituency.

Some facets of the Venezuelan land reform program were unique in Latin America. Although the program initially received high priority in the government, the process was planned, gradual and based on both the distribution of public lands and the compensated expropriation of private land at market prices (Lombardi, 1982). The policy also involved legal titling of the land to the recipients and simultaneous action against those who seized land illegally. Opposition of the landed elite to the program was reduced through these methods and because of their realization that, in an economy increasingly dominated by petroleum, the usual preoccupation with land accumulation as a source of power and wealth was not as advantageous (Eidt, 1975). In the early years after the Agrarian Reform legislation, two situations which further reduced tensions in competing for land were the increase in area which was becoming available because of the success of the malaria eradication program and the availability of vast acreages of state-owned land for distribution (Eidt, 1975).

Schuyler (1980) contends, however, that the odds were against the success of the Agrarian Reform. The intentions of Betancourt's agrarian reform efforts were to increase the productive employment and income of the rural poor and to increase agricultural productivity. To gain the support of a wide range of interests, the programs were promoted as a policy of commercial agricultural development, causing conflicting perceptions of the purpose of the legislation

(Schuyler, 1980). Agricultural production did increase between 1959 and 1963 and the income per person employed in agriculture increased 20 percent between 1961 and 1965 but in that year (1965) per capita income of people in the agricultural sector was still only $152 a year compared to $599 nationally (Ewell, 1984). In Venezuela, the percentage contribution of agriculture to the Gross Domestic Product is the lowest of the Latin American nations and was declining until the 1983 devaluation (see Table 3. 2).

Table 3. 2
Percentage Contribution of Agricultural Sector to Gross National Product

Averaged for years	Venezuela	Latin America
1961-70	7.0	15.6
1971-80	6.3	12.1
1985	7.4	11.9

Source: Economic and Social Progress in Latin America, 1986 Report, Inter-American Development Bank, Washington, D.C., 1986, Table IV-1, p.43.

A key element in Venezuela's early agrarian reform efforts and attempts to deal with interregional and rural-urban economic disparities was the long-range centrally planned program of rural settlements (Eidt, 1975). In addition to the political and economic considerations previously discussed, impetus to implement the rural settlements program stemmed from the high volume of rural-

urban migration occurring in all of Latin America but accelerated in Venezuela by the rapid transformation of the economy due to petroleum production. Over 1,000 new rural settlements were established by the early 1970s and more than half a million people had been settled in them by 1974 (Eidt, 1975).

In 1975, Eidt (1975) considered Venezuela's program of new planned agrarian settlements to be one of the most successful in Latin America, a view considered to be optimistic by Crist (1983) and perhaps reflecting the time difference between the two assessments. In the 1960s, when democratic rule was tenuous, more than 113,000 families received land under the provisions of the Agrarian Reform legislation (Schuyler, 1980). Toward the end of the decade, when the presidency was handed over peacefully to another party, COPEI, the pace of land distribution slowed dramatically as the committment of most segments of Venezuelan society to the new political structure seemed more assured. In 1973, Carlos Andres Perez, the AD candidate, won in Caracas as well as the rest of the country and during his administration from 1974-79, emphasis on expenditures in the rural areas shifted from agrarian reform to expensive irrigation and drainage projects (Ewell, 1984). By 1971, over 77 percent of the Venezuelan people were already living in urban areas. In 1981, the figure had reached more than 84 percent and the threat of a rural revolution had long since

faded as did, ultimately, the committment of Accion Democratica (AD) or any other party to rural reform.

The problem of the strength of the currency continued to negatively affect the position of agriculture in the economy until the drop in the bolivar's exchange rate in 1983. The 1983 devaluation was the first of a series in the descent of the bolivar's value, which is currently valued at about 35 bolivares to the U. S. dollar, or less than one eighth its value in 1982.

Venezuelan agricultural products are now becoming competitively priced at home and in the international markets and exports are increasing. However, Unlike coffee cultivation in the past, production of export crops in recent years has become increasingly an operation conducted by large-scale enterprises. Agricultural corporations and wealthy individuals with access to credit and using capital-intensive methods compete with the peasant farmers for land (Crist, 1984 and Schuyler, 1980). The "new latifundistas" as Schuyler calls them, reverse the traditional pattern and use their wealth acquired from other sources to become large landowners. For them, it is just another form of investment and not a source of prestige in itself.

The waning efforts toward agrarian reform are running counter to the trend for large-scale production in an economy more and more dominated by markets and the needs of the small farmer no longer enjoy political priority in the agenda of

either of the two major parties. In addition, a critical shortage of trained technical personnell willing to work in rural areas and the lack of effective coordination of the dozen or more agencies involved in the program were other major obstacles to effective implementation of agrarian reforms (Schuyler, 1980).

It is generally conceded for the reasons described, that the agricultural sector in Venezuela has been the most neglected component of the economy (Valente, 1979). The timing of reform efforts (however inadequate those efforts were) was unfortunate as well. Schuyler (1980) suggests that agrarian reform lost crucial time during the 1948-58 dictatorship. The full impact of the petroleum economy with the rapidly rising incomes in urban areas was already underway and the land tenure pattern was so concentrated that the massive migration to the urban centers was already at its peak when the rural programs were initiated. Eventually, even the political perspective of the nation and its leaders was affected as Venezuela became an overwhelmingly urban society with greater priority placed on large-scale production to meet the food deficit and the needs of the urban population.

The sequence of events describing the Venezuelan government's agrarian reform program fits, with some modifications allowed for the country's unique circumstances, into Barry Lentnek's summary of the history of ruralist agricultural development strategy. He states: "This policy

has rarely been pursued, however, for any appreciable length of time by Latin American governments because it approaches development primarily at the level of the politically impotent peasant, involves great losses for the politically powerful landowners, and does little initially for the urban middle classes who are beginning to exercise political clout (Lentnek, 1980)."

Summary of Venezuelan Development and Changing Life Conditions of the Population

This chapter summarizes some of the rapid changes in the material conditions of the Venezuelan population in recent history. Through the first two decades of the twentieth century, Venezuela was among the poorer nations in Latin America with an economy based on agricultural exports and a largely rural, illiterate, population. A high mortality rate reflected the living conditions of the times. Life expectancy at birth was only thiry-one years in 1891 and the literacy rate was only about 19 percent (Chen and Picouet, 1979). Forty-five years later in 1936, life expectancy had risen to only 38 years for males and 41 years for females (Valecillos, 1986) and the literacy rate was 21 percent (Weil et al., 1971), an increase of only 2 percent since 1891.

In the decades since, a combination of events causing changes in a broad range of mortality-influencing factors have reduced mortality dramatically and boosted the average life expectancy of the population to levels comparable to developed

countries. Some of the earliest and most dramatic improvements in mortality reduction were the results of imported technologies used to eradicate yellow fever and malaria. Life expectancy at birth had reached almost 53 years in 1950. By 1961, after yellow fever and malaria had been eradicated and the full-scale national government efforts to improve health and sanitation were underway, life expectancy at birth was nearly 63 years. Twenty years later, the 1981 data indicates that it had reached slightly more than 68 years and the most recent CELADE estimate for 1988 is about 70 years.

The policies and programs of the post-dictatorial democratic governments to improve the living conditions of the population were reviewed in this chapter. The approach to development adopted by the elected administrations is, in several respects, a compromise between precepts of both the neoclassical and political economy perspectives. The strategy involved national and regional planning with state participation in key sectors of the economy while retaining an external market orientation. The extent of the government's economic planning and participation exceeded that of all other governments in the region except Cuba. Improving social welfare became an important national priority and numerous programs were initiated to implement those objectives. The programs included: improved capacity to provide clean water and sewage, expansion and extension of

public education, provision of public housing, nutritional assistance programs for children, construction of public health clinics, malaria eradication, major efforts to establish new agricultural settlements and carry out agrarian reform through compensated expropriations, and the creation of an extensive state planning organization (CORDIPLAN) to coordinate sectoral and regional components of national growth.

The national government's committment to agricultural reform waned as the political constituency moved to the cities and it became more politically expedient to direct social investment to urban areas. Funds appropriated for agricultural development were redirected toward large-scale commercial producers and away from small farmers. These changes in policy or committment left rural poverty an unresolved problem although it had been a priority in the earlier post-revolutionary years and, in fact, had generated much of the support for the end of the dictatorship.

In this chapter, broad dimensions of the social and economic changes occurring in recent decades in Venezuela are described, emphasizing their impact on the living conditions of the population with the purpose of revealing how structural changes in the determinants of mortality came about. At the aggregate national level, it is apparent that very substantial reductions in average mortality and a consequent increase in life expectancy have occurred. But it is also apparent that

there is still a wide gulf between the living conditions of different economic strata of the population and between rural and urban areas.

In Chapter II, the social, economic and geographic variables which have been demonstrated to be important determinants of mortality were reviewed. In this chapter, a summary of the particular Venezuelan context in which those variables operate and evolved has been presented. Quantified information about many mortality-influencing variables is available for the nation in disaggregated form, particularly from the census data. It is possible to determine in great detail in Venezuela which people, living where, in what kind of houses have particular personal characteristics.

However, no estimates have been made of the impact of those variables expressed in differential mortality levels for population subgroups defined by social and spatial criteria. The following chapter describes the methodology of indirect estimation used to derive mortality levels of selected populations from census sample survey data. The procedures for determining the strength of association between selected mortality-related variables and childhood mortality are also presented.

The review of salient features of Venezuela's economic and political history in this chapter point to a number of inequalities in life conditions of the population which may be reflected in their mortality characteristics and vary

according to spatial and social distinctions. Income distribution remains strongly skewed and a primary line of investigation will be the association between mortality and income. Income varies according to spatial distinctions such as region of the country and rural or urban residences. The basis of these spatial disparities are, in turn, derived from the country's economic and political structure. Agricultural workers and other rural people remain at a severe disadvantage in terms of income opportunities compared to workers in most urban areas. Quality of education and accessibility varies substantially between urban and rural areas and between public and private schools. There are disparities between regions and between urban and rural areas in access to water, sewerage, and other services.

The determinants of mortality reviewed in Chapter II and the disparities in the life conditions of the Venezuelan population described in this chapter suggest the criteria for selection of variables and population groups for comparative analyses of mortality. The methodology, data source, and procedures used in this research to conduct comparative analyses of population mortality levels and determinants of mortality in Venezuela are described in the following chapter.

CHAPTER IV
METHODOLOGY, DATA SOURCE, AND PROCEDURES

Mortality Estimation Techniques

Indirect Demographic Techniques and Brass-type Procedures

The Brass-type methods of mortality estimation used in this investigation are part of an array of indirect demographic estimation techniques. These techniques have been developed in an effort to measure basic demographic features of a population under imperfect conditions such as incomplete or inaccurate vital registration and census statistics which are the traditional data sources for generating this information.

The techniques are termed "indirect" since the demographic estimates are based on data that is only indirectly related to the values produced and depends on models or in any way uses conventional demographic sources in an unconventional way (UN, 1983). A typical example would be the use of the proportion of children surviving to children borne by the mothers' age group to determine the probabilities of child mortality by specific ages.

The need for indirect procedures evolved from the difficulties faced by demographers and other population researchers in obtaining reliable data from the traditional

sources in developing countries. Where a continuous, complete and accurate system of vital registration exists in combination with periodic censuses of high quality, demographic measures of mortality or fertility, for example, can be calculated directly from the data. In most developing countries the census and/or vital registration systems are inadequately implemented or virtually non-existent. Considerable resources, including a large number of trained personnel, are required to effectively collect, organize and process large amounts of information of this type. Resources such as these are frequently not available.

Deficiencies in birth and death statistics may arise from problems in: 1) definitions applied to births and deaths; 2) completeness of registration information and 3) allocation of the recording of vital events by time and place (Shryock and Siegel, 1975). The cause of the first problem is that individual countries may apply different definitions of what constitutes a birth or death depending on the period of survival of the infant. But, more pertinent to the need for indirect techniques is the second problem--incomplete registration. For developing countries, completeness of registration is the most serious problem because of either a) incomplete coverage of the entire geographic area of the nation or of all population groups or b) non-registration of all the vital events in the registration area. An analysis conducted by the United Nations in 1951-55 found that only 33

percent of all deaths worldwide were being recorded and the percentage being registered was as low as 7 percent in some countries (Shryock and Siegel, 1975).

A number of common registration deficiencies result from a frequent tendency not to record all vital events at the time and place of their occurrence (UN, 1983). An excess of births and deaths are located and recorded in urban centers because hospitals and clinics are concentrated in those areas. Misallocation of births and deaths as well as incomplete registration occurs more frequently in countries or parts of countries where large numbers of people have little or no connection with government administrative or service organizations such as schools, hospitals and other social services. Many births or deaths are recorded long after the event, or never reported at all to a national records office.

Even countries such as Venezuela, with substantial resources devoted to supporting national public service agencies (Martz and Myers, 1977), have difficulties in obtaining complete vital registration data in remote rural areas and among indigenous populations. These problems, and the large number of immigrants who have come illegally to Venezuela, are conditions which may substantially contribute to reporting imbalance in the case of that country's vital registration data. Deaths occurring among the illegal immigrants are recorded in Venezuela but may have no corresponding record of birth or immigration.

Censuses, which are the other source of demographic data, also present accuracy and underenumeration problems in developing nations. Similar problems occur in more developed countries but are far less acute because of the more complete documentation of a person's vital events and activities in economies based on the wide-spread use of contracts and records and with the means to obtain, record and process large amounts of statistical information.

In response to these difficulties indirect techniques of demographic estimation were developed which have evolved dramatically in recent years and become widely accepted (Trussell and Preston, 1982; Trussell, 1975). It has become possible, through the use of questions designed specifically for sample surveys, to obtain information from which mortality and fertility levels of the surveyed population can be extracted using these indirect techniques. When the survey is part of a nationwide census, a powerful population research tool is created as a by-product through the combination of indirect mortality and fertility estimation with the survey information on individual and household characteristics (Wood and Carvalho, 1988; Escudero, 1980). This potential did not exist previously using the traditional vital registration information, even where the quality of the data was high, because only a limited amount of information, if any, about household characteristics is included on birth and death certificates. In many developing countries questions are now

included in census sample questionnaires and many special surveys to elicit from women respondents information regarding the total number of live births, number of surviving children and age of the mother.

Two indirect demographic techniques are employed in this research to estimate the mortality characteristics of the population of Venezuela. One method is used to derive the average number of years of life expected at birth for a selected group of people. The population groups used in this study were selected by income level, urban or rural residence, region, and educational level. The other method is used to estimate the relative strength of the relationship of childhood mortality and selected measures of living conditions (water, sewage etc.). Both techniques are derived from the work of William Brass (1964) and the use of regional model life tables. The two methods are described in the following sections.

Estimating the Mortality Level of A Population

A procedure was first developed by William Brass (Brass, 1964) and further refined by Trussell (1975) to convert the proportions surviving of children ever born as reported by women in five-year age groups into estimates of the probability of dying by certain exact ages. The procedure converts the proportion dead, D, among children ever born to women in each five-year age group (i), into estimates of q(x), the probability of dying between birth and exact age x.

The number of births to a group of women are distributed over time and the length of time since birth for each child is the period of time that the child has been exposed to the risks of dying (UN, 1983). The length of exposure to the risks of dying (as determined by distribution of the time of the births) determines the proportion dead of children ever born to a group of women. Brass determined that the age pattern of fertility influences the relation between the proportion of children dead D(i) and q(x) since the pattern also determines the period of exposure to the risk of dying.

The Brass equation for estimating q(x) is:

$$q(x)=k(i)D(i),$$

where: k(i) is a multiplier used to adjust for non-mortality factors determining D(i). To estimate the multipliers k(i) it is necessary to select a set of coefficients for each of the 5-year age groups from one of four regional model life tables. A detailed description of the formulas and steps involved in calculating the multipliers or adjustment factors is presented later in the Procedures section of this chapter.

Model life tables

Life tables and their functions are the foundation of the concept of regional model life tables used in this dissertation and some results are stated using the life table function, e0, life expectancy at birth, as an index. It would be a lengthy deviation from the purpose and scope of this research to present a complete discussion of the generation

and the numerous applications of life table functions to demographic analyses. However, a brief discussion of life tables, their use and relevant functions is essential to explain the methodology employed.

A life table is a summary description of the effects of age-specific mortality rates on a population cohort from birth through their entire life (UN, 1983). It is a way of combining the mortality rates of the population being investigated into a single statistical model and enjoys several advantages over crude death rate, age-specific death rate and standardized death rate measures. As a summary measure of mortality, the life table does not reflect the effects of a population's age distribution and does not require adjustment to a standard population to make comparisons to mortality levels of other populations. Life tables permit the population geographer to compare the mortality experiences of populations internationally, regionally, at different time periods (Woods, 1979) or by any other variable specifying the population, such as occupation.

It is inefficient and unnecessary to compare all of the functions and age categories of the life table of one population to that of another when the purpose of the research is comparison of relative mortality experience and not demographic analysis per se. One of the life table functions, life expectancy at birth (e^0) is frequently used as an index of mortality for the whole population (Woods, 1979; Shryock

and Siegel, 1975). It is an easily communicated concept which effectively provides a quantitative index of the outcome of all possible mortality risk factors on the specified population. The advantages of its use in comparing quality of life were discussed in more detail in Chapter II.

Life table function curves

The two life table functions used in this research are:

nqx - the probability of dying between age x and x + n years and,

ex - the remaining number of years of life expected at age x.

As discussed earlier, the ex value used here will be e^0, the number of years of life a person can be expected to live after birth, or life expectancy.

These two functions each have a specific relationship with age which, when graphed, appears as a distinctive U-shaped curve. The shape of the curve is remarkably consistent so that even where different medical, economic and cultural circumstances exist, causing different mortality levels, the basic pattern of probabilities in relation to age remains the same.

This essential feature--the consistent shape of the curve --is a key element in the ability to make comparative statements about the mortality experience of different populations from a limited amount of information about childhood survival rates and mothers' ages. If the

probability of dying 'q' during certain exact age intervals, 0-2 years (2q0), 0-3 years (3q0), and 0-5 years (5q0) for example, can be calculated from survey data, it is possible to derive an overall mortality level for the population as a whole. Once the level has been estimated at these age intervals, using the characteristic shape or pattern of one of the Coale-Demeny (1983) regional model life tables, the remainder of the mortality schedule can be extrapolated. In other words, if we can calculate the 2, 3, and 5q0 values which determine the survival probability of children, we can combine these estimates into a single life expectancy measure for the population as a whole. These estimates moreover can be disaggregated according to income, education, residential location and other social indicators thereby providing a unique empirical analysis of the stratification and distribution system within a particular society, in this case, Venezuela. Through this technique it is now possible, using data from a census survey sample, to select a specific population by any variable in the data set for mortality analysis.

Regional model life tables

Coale and Demeny (1983, 1966) examined 326 life tables representing actual populations from different countries and time periods. Their analysis revealed four distinct mortality schedules or patterns which they called "North", "South", "East" and "West" referring very generally to the respective

regions of Europe where the patterns were found to be typical. Briefly, the regional models differ in the shape of their age-specific mortality curves from the "standard pattern" i.e. the average of the tables as follows:

a) East model. This regional model deviates from the average or "standard" in having relatively high mortality rates in infancy and older ages; typical in a number of East European countries.

b) North model. This model is distinguished by its comparatively low mortality rates in infancy and ages over 50 and relatively high childhood mortality.

c) South model. Based on life tables for Spain, Portugal, Italy, southern Italy and Sicily, the model is characterized by relatively high mortality under age 5 and over 65 and low mortality from 40 to 60 years of age.

d) West model. This model is derived from the broadest variety of tables and does not deviate in any systematic fashion from the pattern observed when all available life tables are combined. The West model is the recommended choice when there is no reason to expect that another regional model is more characteristic of a population (UN, 1983).

The regional model life tables were used by Brass to calculate the adjustment coefficients used in estimating child mortality from the proportions of children surviving by the mothers' five-year age groups described as the Brass method previously. The method estimates mortality levels for

children born to selected groups of women. The tables of coefficients for each regional model also provide the adjustment factors used in the following techniques for estimating the strength of mortality covariates from the childhood mortality rates of individual women.

Trussell-Preston Techniques for Estimating Childhood Mortality Covariates

A special demographic technique utilized in this research is a statistical procedure developed by James Trussell and Samuel Preston (1982) for estimating the associations between child mortality (as derived from the Brass-type data) and the characteristics of the household and community where the children were born. The method uses information on childhood survival from individual women. Four variations were developed and tested by Trussell and Preston. The different procedures were constructed to make use of the type of information which might be available in a data source about the mother and/or children. Three of the procedures used either information about the duration of marriage or the ages of the surviving children. Duration of the marriage was not an item of information included in the Venezuelan census sample. It was also impossible to discern from the census sample which children in a household were those borne by a particular woman in that home. Therefore, the three procedures requiring that information were eliminated and the procedure which was used, referred to as Method I in the

Trussell and Preston (1982), was selected since the necessary data was available in the Venezuelan census public use sample.

Calculation of the individual mortality ratio values as a proportion of the expected ratio values of the larger population permits the values for the individual characteristics of the mother and/or the household in which she lives (level of the mother's education, for example) to become independent variables in a regression using the observed individual household mortality ratio's variation from the general population's mortality ratio as the dependent variable. The computational steps and formulas are described in the procedures section.

Data Source

1981 XI Venezuelan Census of Population and Housing

The data source used in the demographic techniques described in the previous section was the 1981 Venezuelan XI General Census of Population and Housing public use sample. Census activity in Venezuela first began in systematic form in 1873 with the First Official Census of The Republic although previously a total count of population for each province had been conducted in 1847 and 1857. After 1873, censuses were conducted somewhat irregularly (1881, 1891, 1920, 1926, and 1936) until 1941. By 1941, the Venezuelan census had evolved into the form which would be categorized as a modern census in terms of its coverage and utility. It

was also the first year in which a systematic census of housing was included with the questions related to population characteristics. Venezuela conducted the 1950 census as a subscriber to the agreements reached by the 1950 Census Commission of the Americas, sponsored by the Interamerican Institute of Statistics, setting standards for a "minimum interamerican census" to facilitate international comparisons (OCEI, 1985). From that time, Venezuelan censuses have been comprehensive in their coverage--a feature of considerable importance to a government with extensive involvement in planning the growth and development of the country.

The 1981 XI Venezuelan census was conducted by the Oficina Central de Estadistica e Informatica (OCEI) or the Central Office of Statistics and Data Processing, in Caracas. During a field trip to Venezuela by the researcher, officials of OCEI indicated they would be willing to release copies of the public use sample tapes to the University of Florida. The tapes were subsequently acquired, as well as some of the published volumes of the 1981 census.

Sample and Coverage

The size of the census sample as a per cent of the total population varied for each state and federal territory (Entidad Federal) in Venezuela (Appendix Table A), ranging from a 1.18 percent sample in the Federal District (Caracas) to 37.00 percent in the Amazonas Federal Territory. Nationwide, the sample averaged about 3.9 percent of the total

population. According to the Venezuelan census office, the purpose of the variation in the per cent of the population sampled was to ensure an adequate total sample size for each state for statistical analyses (OCEI, 1984a, Resultados de Avance).

The non-proportional sampling at the inter-state level requires a weighting procedure when conducting national or regional level analyses where more than one state is involved. In addition to the total population and sample size for each state, Appendix Table A shows the weight factors used in all calculations applied to the total national population to compensate for different sample percentages used in the individual states.

Within each state the sample was geographically distributed among the sub-state political divisions (distritos and municipios) in proportion to the population size of those units. The distribution was checked by producing a geographic frequency distribution at the municipio level of the sampled population from the tape. These frequency distributions were then compared to the published total populations from the complete census. The population distribution among among selected municipios from the public use sample compared proportionally to the complete census distribution percentages, verifying that sampling within each state was proportional.

Procedures

Creating the System File for Demographic Analyses

Analyses of mortality in connection with variables of geographic location, income and other individual and household characteristics required the creation of an useable SPSSx system file from the raw data contained in the tapes. Information from the public use sample questionnaires was coded by OCEI onto two computer tapes, one for household information, and one for the characteristics pertaining to the individuals of each household. The research goals of this dissertation required that housing variables be attached to individual personal records. To match individual data with household information, the tapes were merged to produce a single rectangular file with the census of housing information attached to the record of each person in the household.

A major problem in adapting the census data as it existed to the requirements of this research involved converting the three different ways income was reported in the census into a single standardized time frame. Income had been recorded on the questionnaires and coded as a daily, weekly or monthly rate. The daily and weekly rates were converted to a monthly salary figure because a monthly rate is a commonly used time frame for income comparison and it is the most frequent rate recorded in this census. This was accomplished by multiplying reported weekly rates by four and daily rates by twenty-one, the usual number of working days in a month. During this

process, households not disclosing income were excluded from the file.

It was decided to accept the necessity of introducing some errors in the final personal income rate using the fairly simple method of multiplying by factors of four and twenty-one. Persons reporting a daily income rate, for example, would not necessarily be earning income each working day of the month or year. The most probable direction of bias would therefore be a tendency to overestimate income. The size of the data set would have meant that to obtain more precision by considering the number of days or weeks actually worked would have involved an enormous amount of data processing for this one variable.

The next problem was the aggregation of reported personal incomes within each household to produce a total household income which could then be attached to all individual records of persons in the household unit. Creating a standardized household income to be attached to the records of women of childbearing age was a prerequisite for utilizing these records to derive mortality information by household income level. The size of the data set, 531,000 records, required disaggregating the sample into nine regional data subsets in order to aggregate the personal incomes to a household total.

A system file of women of childbearing age, 15-49 years, was extracted from the total census sample and then matched to the household income records to create a new system file

with a household income variable attached to the individual woman's record. The file of 131,000 cases contains the variables pertaining to individual characteristics of the women and the household characteristics including the newly created household income variable.

Variables Selected for Analysis

The variables selected to be analyzed in terms of their association with variations in mortality in Venezuela were discussed in more depth in Chapter II. The Trussell-Preston procedure for estimating the strength of the covariates of childhood mortality was used with data from the census which provided measures of income, mother's education, quality of housing, access to health-related infrastructural improvements and residence (region and rural-urban) which have all been suggested as important mortality-influencing factors. The income variable is described at length in a following section and in the previous discussion of the data set.

A brief description of the other variables used as inputs to the Trussell-Preston method is included here with their variable label abbreviation used in the SPSSx data system file shown in parentheses:

Level of education (LEVED). This variable, used in both the mortality covariate estimation and life expectancy estimate by level of education is simply the number of years of school completed by the mother. Re-coding was necessary as the original census coding was divided into two parts

(fields), one with the number for the level of school--primary, secondary and higher and another field for the number of years completed at that level.

Area (of residence) (AREA). The area of residence variable used in the census and in the analyses refers to whether the dwelling is located in an urban or rural area. A dispersed population or population center with less than 1,000 persons is classified as rural and coded as 3 in the census while those population centers with more than 1,000 persons are classified as urban and coded with a 1 or a 2. The 2 is a code used to denote "ranchos", the self-constructed poor housing peripheral to the cities and has been included with the urban population for rural and urban mortality estimates. In the Trussell-Preston technique, rural or urban residence is used as a dummy variable. Therefore, 3 (rural) is re-coded as 0 and 2 has been re-coded as 1 since it is part of the urban population.

Sewerage (TOILET). The sewerage variable was re-coded as a dummy variable 1 or 0 from the census questions about the presence and/or type of toilet in the house. Those homes with a toilet connected to a sewer line were coded as 1 and homes with other means of waste disposal, such as a latrine or no facility, were coded as 0.

Running water (RUNWATER). This variable refers to whether the home has piped water installed in the home (coded 1) or not (coded 0).

Source of water (SRCWATER). The original census codes corresponded to several types of water sources. The responses were re-coded so that dwellings connected to water lines from a water treatment plant are coded 1 and those with another source of water are coded as 0.

Bathroom (NOBATHR). The number of rooms in a house with a bath or shower was coded in the original data and was later re-coded during the mortality covariate analysis as 0 for no bathrooms or 1 for one or more bathrooms.

Region. A second spatial variable used in this research to control for place of residence is the region of the country. In this research, the administrative regions defined in Chapter III are used. It is an important variable in this research as some regions in Venezuela are much less developed than others and have distinctive physical, economic and social environments. Regional location is not coded with household or individual characteristics in the original census data, so the regional population samples are constructed by aggregating the weighted state and territorial data. Each region is then included into the Trussell-Preston procedure as a dummy variable, excluding the Capital region as a reference.

Use of the Income Variable and Income Levels

The income variable was used in both techniques--the Brass life expectancy extrapolations and the Trussell-Preston childhood mortality covariate estimations. In the latter calculations, the log of the household income was used as one

of the independent variables in the regression program. The log was preferred to the actual income figure because of the skewed nature of the income variable with a few extremely high income households.

To compare life expectancy differences by income level, population quintiles (five population groups divided by household income level, each constituting 20 percent of the total households in the sample) were used. The five categories were also a means of controlling for income to compare e^0 differences between population groups defined by other variables, such as geographic location. Disaggregation of the population into quintiles was chosen as a compromise over other possible levels of division. The use of deciles would have reduced the number of cases available for each category to the point that in sub-national analyses there would be too few cases for the program to function. Fewer divisions would have expanded the income ranges to the extent that economic differences in mortality would have been diluted.

Income quintiles were determined by making a frequency distribution of all households nationwide by income and locating the cumulative per cent break points (20, 40, 60, and 80 percent of the households). The break points for these percentages were respectively, 1-1,399, 1,400-2,399, 2,400-3,739, 3,740-6,199 and 6,200+ bolivares per month (in 1981, the bolivar was valued at 4.3 bolivares to one U.S. dollar)

household income. Controlling for income by comparing similar categories permitted better comparisons of quality of life (mortality levels) between regions and rural and urban areas where the aggregate effects of higher or lower personal income levels may have a great impact. Although the percentage distribution of the population into the five income categories does not necessarily apply at the sub-national level, it serves to create groups which are roughly comparable in terms of income.

The problem which occurs when converting daily wages to monthly incomes was previously noted in the section describing the creation of the system file. There are a number of other caveats should be stated regarding income and its use in this research. The income quintile categories are not precisely comparable for sub-national areas because spatial differences in the cost-of-living index are another source of distortion of the income variable. The resulting bias favors the rural areas insofar as the cost of living there is generally (monetarily, at least) less than in urban areas and crop cultivation can provide some, if not all, of the household's food requirements. Inter-urban cost differences are also quite substantial. A few cost indices for selected locations were estimated and published by OCEI (Anuario Estadistico, 1984b) but it is impossible to obtain such measures from all the urban and rural areas and incorporate them into this analysis on a systematic nationwide basis.

Another problem concerns the two different time frames involved: the one in which the children are born to a woman and the date of the census. The response to the census income question is obviously given on a specific date, whereas the questions about the number of children born and surviving (mortality information) pertains to a decade prior to that date. Income mobility may have taken place and the household resources which influence mortality may have changed (up or down) causing the woman to be mis-classified in terms of income for the period of childbearing. While it is not possible to remove this bias altogether, using broad income categories (as done here) considerably reduces the magnitude of the bias as it minimizes the degree of mobility across income strata.

Reported household incomes of '0' were excluded from the disaggregation by income quintiles but not from estimates for the total population of each region. They were excluded because '0' income households present problems for comparative analyses since it is unclear what they actually represent. Some '0' income responses may be subsistence households, in which case, it is impossible to ascertain what their income in self-produced and consumed goods would be in monetary value. Income may also be received in kind for services performed such as the provision of living quarters for domestic help or work performed on large rural estates. Other '0' income responses are possible misclassifications of non-

response to the income question. Unemployment is, of course, also a reason for many of the responses but some type of income in kind or from savings would have been received or the household would fail to survive.

Application of the Brass Technique to Selected Populations

After the modifications to the census data described in the previous sections, the two indirect Brass-type procedures were applied using the described variables to analyze selected features of variations in mortality in Venezuela. For each population group selected for mortality analysis (defined by variables of income level, place of residence, level of education), the total number of women of child-bearing age, children ever born and children surviving was extracted and aggregated into the 7 five-year age categories required by the Brass procedures: 15-19, 20-24, 25-29, 30-34, 35-39, 40-44 and 45-49. A program which executes the Brass technique was then applied to the aggregated groups to calculate mortality levels.

Life expectancy estimates were derived for the whole nation; each region's total, rural and urban population; each household income quintile group in the nation; income quintiles by rural and urban residence; the urban populations of eight national sub-regions by income quintile; the rural population of the Andes region by income quintile and selected educational levels of the mother by income level, cross-classified by urban and rural residence.

The time-frame problem (between the date of the census and the reference period of the mortality estimates) mentioned in the discussion of income mobility also presents difficulties in comparing urban and rural mortality rates. Mothers categorized as urban residents may have moved from rural areas during the period of reported child-bearing and mortality. Their mortality rates may represent rural conditions, rather than those of the urban center, where they currently live. Whether the prior residence was urban or rural cannot be determined from the 1981 census sample.

The Insular region was excluded from the analysis because the region includes only the state of Nueva Esparta, which consists of Margarita Island and some small, offshore islands, the Federal Dependencies. Together, they have less than 200,000 people, and even with a larger proportional sample, the region did not provide enough cases for analysis after more than a few levels of subdivision for mortality estimates.

Initially, attempts were made to produce estimates of life expectancy by income quintile for each of the twenty-four states and federal territories, but it was soon apparent that the degree of disaggregation decreased the number of cases available for each cell category to an unacceptably low number to produce reliable results. State-level estimates of life expectancy would have been an useful component of the spatial-demographic analysis of development in Venezuela because states and territories are the primary geographic units for

which summary statistics are tabulated and published by the Venezuelan census office (OCEI).

Dissagregation of the population by income (or any other desired variable) is a principal advantage of the Brass method crucial to this research. A problem which does arise however, stems from the degree of disaggregation required when attempting to analyze increasingly narrowly defined population subgroups, some of which become rare or non-existent, such as the highest income groups from the rural area of a specific region. To derive a mortality estimate for any given population group, it is first necessary to divide the number of children ever born and surviving into categories by the age of the mother. To control for the variables under investigation, for example, these groups would have to be further divided into groups according to the five income levels, region of the country, rural or urban residence, education level and the various household sanitation facilities present. At this level of disaggregation, in a population more than 84 percent urbanized, there are often too few or no cases at all in some of the cells of input information required by the program to produce reliable results. For this reason, the Trussell-Preston regression technique is a useful auxiliary method because all of the selected mortality variables can be simultaneously controlled.

The program used to execute the Brass computations included options available to estimate mortality using any or

all of the regional model life tables. The program output is two sets of mortality levels, the Trussell and Sullivan variations of the basic equation. The two versions employ a slightly different set of coefficients because the data bases used are different. The results from the Trussell variant are used in this analysis because it is based on a wider range of cases (UN, 1983; Trussell, 1975) but there is no obvious advantage since the objective is to make relative comparisons of mortality.

The first execution of the program was made using all four regional model options: North, South, East and West for all the households in the country to check the performance of the program against available information from CELADE on the aggregate national mortality information. The Trussell set of equations, produced a mortality level of 21.74 using the West regional coefficients which converted to an e^0 of 68.2 years for both sexes. The estimate was nearly identical to the CELADE estimate of 68.19 years. The West model life table is used by that organization and the Center for International Research, U. S. Bureau of The Census, so it was selected for all mortality estimation procedures for specified populations in Venezuela. The use of this model makes the assumption that the West model approximates the mortality patterns of all the population subgroups in Venezuela. Even if the assumption were not correct, the intent is to reveal the relative differences in mortality between groups and not produce

precise e^0 estimates. The differences in childhood mortality levels which are derived from the proportions of children surviving remain regardless of the regional model employed to make projections about the remaining number of years of life to be expected by a selected population group.

Application of the Trussell-Preston Mortality Covariate Estimation Procedure

The steps involved in executing the Trussell-Preston method of obtaining estimates of the strength of childhood mortality covariates are described below.

Step 1 - Calculate the mortality multipliers or adjustment factors, k(i) for the Trussell variant from Appendix Table B for each five-year age group of mothers according to the formula:

$$K(i) = a(i) + b(i)(P1/P2) + c(i)(P2/P3),$$

where:

K = the mortality multiplier or adjustment factors,

i = the mothers' age group (20-24, e.g.), and

a, b, and c = regression coefficients from Appendix, Table B (West model);

P1 = number of children ever born/total number of women in age category 20-24 (totals were aggregated from the census public use sample data);

P2 = number of children ever born/total number of women in age category 25-29 (obtained same as above);

P3 = number of children ever born/total number of women

in age category 30-34 (obtained same as above).

Step 2 - Calculate K' from Table 1 and Step 1:

$$K' = q(a)/K$$

where:

K' = the expected proportion dead among children ever born to all mothers in age group (i),

q = standard mortality values for the four families of model life tables in the Coale-Demeny system (Coale and Demeny, 1983),

a = mothers' age group (e.g. 15-19), and

K = mortality multiplier calculated in step 1.

Step 3 - Calculate E(i) as given by:

$$E(i) = B(i) \times K'$$

where:

E = expected number of deaths among the children of women in age group (i),

B = number of children ever born to women in age group (i),

K' = the expected proportion dead among children born to all mothers in age group (i) derived from Step 2.

Step 4 - Calculate the ratio of the individual observed ratio to the expected mortality ratio (observed group mortality)

$$M(i) = O(i)/E(i)$$

where:

M = ratio of the observed individual mortality ratio to the expected mortality and,

O = observed number of deaths among children ever born to the individual mother.

The above steps were executed using the coefficients from the West model life tables and the information from the public use sample as follows:

Step 1 - K was calculated for mothers' age group i, 20-24 years:

$$K(i) = a(i) + b(i)(P1/P2) + c(i)(P2/P3),$$

$$K(i) = 1.2563 - .5381(.224276) - .2637(.537497),$$

$$K(20\text{-}24) = .993879,$$

and for the 25-29 year age group,

$$K(i) = 1.1851 + .0633(.224276) - .4177(.537497),$$

$$K = .974784.$$

Step 2 - K' was calculated for the 20-24 age group:

$$K' = q(a)/K,$$

$$K' = .0655/.993879,$$

$$K' = .0659,$$

and for the 25-29 age group,

$$K' = .0699/.974784,$$

$$K' = .0717.$$

Step 3 - Calculate for each individual case from census sample of those women who have ever given birth the actual or observed ratio of dead children to children ever born for each age group (20-24 and 25-29):

O = Total dead/Children ever born (total dead = total ever born - total surviving).

Step 4 - Calculate for each mother in age group 20 - 24:

$$M = O/.0659,$$

and for each mother in age group 25 - 29:

$$M = O/.0717.$$

Steps 3 and 4 were calculated by computer utilizing the census data as input for the individual mortality information (proportions dead of those ever born). The mortality ratio 'M' is treated as the dependent variable and regressed on the dependent variables--the individual and household variables described in this chapter. The results of the application of the mortality estimation techniques for selected populations in Venezuela and the mortality index regression are presented in Chapter V.

CHAPTER V
SPATIAL AND SOCIAL PATTERNS OF MORTALITY IN VENEZUELA

Disaggregated Brass Mortality Estimates

This chapter presents the results of the application of the two types of indirect procedures to estimate mortality levels. The mortality estimates for disaggregated population groups using the Brass technique are given first. The Trussell-Preston childhood mortality index regression method is then used to determine the relative strength and statistical significance of the selected independent variables. The variables used in both methods are the individual, household and spatial determinants of child mortality identified in Chapters II and IV.

Spatial Inequalities in Length of Life

Spatial criteria are used to investigate differences in quality of life between populations residing in different areas and to suggest the socioeconomic mechanisms which produce them. Life expectancy estimates calculated for the total populations of each of the eight administrative regions reflect the spatial differences in social and economic characteristics in Venezuela described in chapter III. Table 5.1 shows that the highest life expectancy is 70.5 years, in

the Capital region. The lowest estimate is 65.5, in the Andes. Hence, the life expectancy values show a maximum range of 5 years when we divide the country into eight geographic regions. The Northeast, Guayana and Central regions are very close to the national average, 68.2 years. The Llanos, Andes, and West Central are about two to three years below the average.

Table 5.1
Average Number of Years of Life Expected at Birth
By Region and Place of Residence 1981

Region	Total	Rural	Urban	Urban/Rural
Capital	70.5	71.1	70.4	.99
Central	67.8	64.6	68.1	1.05
West Central	66.4	64.1	67.4	1.05
Guayana	67.8	63.1	68.9	1.09
Andes	65.5	61.4	67.8	1.10
Llanos	65.8	62.8	67.1	1.07
Northeast	68.0	65.5	68.8	1.05
Zuliana	69.4	64.0	70.6	1.10

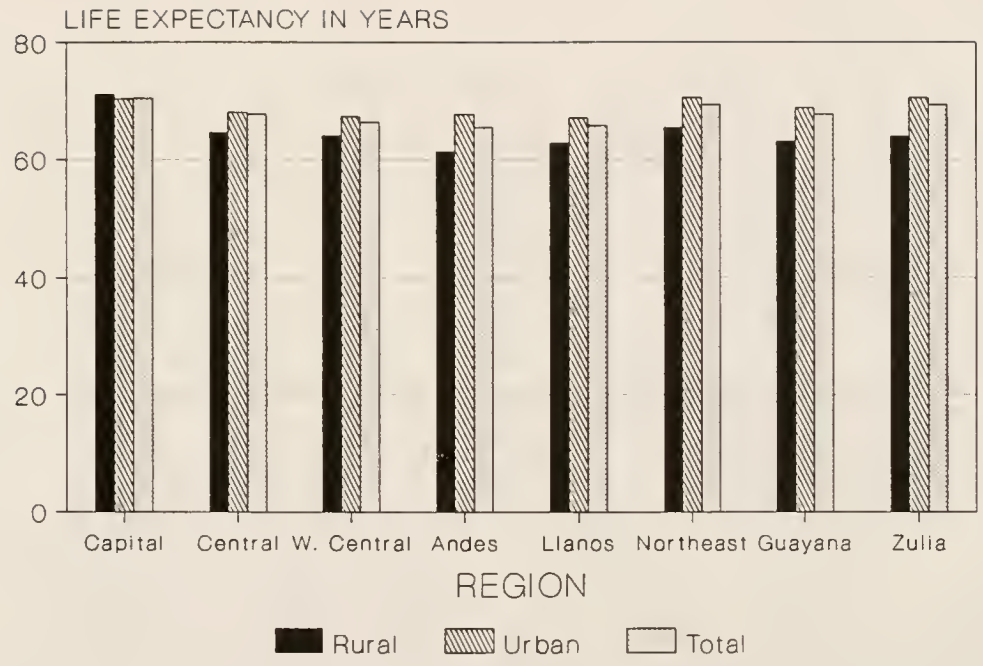
When the regional populations are further disaggregated according to rural and urban residence, the range of variation increases to about 9.7 years. The lowest life expectancy estimates are found in the rural Andes, 61.4 years, and the rural Llanos, 62.8 years. The highest estimates are found both in the rural and urban populations of the Capital region and the urban population of Zulia: 71.1, 70.4 and 70.6 years, respectively. The Guayana, Zuliana and the Andes regions all show a difference in estimated length of life greater than 5

years between their rural and urban areas: 5.8, 6.6 and 6.4 years, respectively.

The ratio of urban to rural values shown in the right-hand column of Table 5.1 is another way to illustrate the pattern. Except for the Capital region, all urban life expectancy estimates are higher than the rural rates. On average, urban life expectancy exceeds that of rural areas by approximately 7 percent.

Differences in life expectancy between urban and rural areas contribute to the observed regional variations in two ways. The regional life expectancy value is the result of the weighted average of the rates in urban and rural areas, the weights being the number of women 20-34 years of age in each place of residence. In regions where rural mortality is high, and where there is a high proportion of people living in the countryside, the average life expectancy for that region is pulled down.

Some examples highlight the importance of the rural-urban population distribution as a contributing element to regional differences in length of life. Fig. V-1. illustrates the point. It shows the Central region's total and urban population mortality levels are nearly the same (67.8 and 68.1 years), while there is a greater difference between the total and urban estimates (65.5 and 67.8) for the Andes region. Ninety-five per cent of the sample population from the Central



Source: 1981 Venezuelan Census Sample

Fig. V-1. Life Expectancy by Region and Place of Residence

region lives in areas classified as urban compared to the Andes, where only 73 percent are urban residents (Table 5.2).[1]

Table 5.2
Rural and Urban Distribution of
Population Sample* by Region

Region	% Urban	% Rural
Capital	97	3
Central	95	5
West Central	79	21
Guayana	88	12
Andes	73	27
Llanos	79	21
Northeast	83	17
Zuliana	90	10

*Sample does not refer to the whole public use sample of Venezuela, but rather to the population of women 15-49 years of age used in this research.

The Central region's average length of life reflects the lower mortality levels of a highly urbanized population. By comparison, the Andes, with the nation's highest overall regional mortality, has the highest percentage of its population living in rural areas. The region's average life expectancy is further decreased by the rural Andean population's average 61.4 years length of life, the lowest rural estimate for any region.

[1]The geographic distribution percentages of this sample are not necessarily the same as those of the total population because the sample used for the Brass estimates is necessarily a selected population including only women from 15-49 years of age. In most urban areas in Latin America, a higher percentage of women than men live in metropolitan areas, meaning that this sample probably slightly overestimates the urban population percentage.

The same two components--high rural mortality and a relatively higher percentage of the population living in rural areas--also contributes to the Llanos region's estimated life expectancy of 65.8 years, the nation's second lowest. The region has the second highest percentage of people living in rural areas, 21 percent, and the second lowest rural life expectancy--62.8 years, nearly 6 years below the national average.

The magnitude of the rural-urban mortality difference also affects the regional average. Compared to the Central region, the Northeast has a lower percentage of its population living in urban areas, 95 and 83 percent respectively, but the higher urban life expectancy of the Northeast region still gives the Northeast a slightly higher regional average.

Similarly, the average life expectancy estimates for all of Venezuela are affected by regional levels of life expectancy and by the percentage distribution of the population living in each region. The average expected length of life for the nation, 68.2 years, is higher than all but two of the regional averages (see Table 5.1). However, these two regions, Capital and Zuliana, have more than 35 percent of the total Venezuelan population (Table 5.3), thus raising the national average.

Table 5.3
1981 Venezuelan Population
Distribution by Administrative Region

Region	Population	Percent of Total
Capital	3,492,184	24.0
Central	2,087,882	14.4
West Central	2,174,541	15.0
Guayana	770,727	5.3
Andes	1,879,496	13.0
Llanos	582,184	4.0
Northeast	1,657,951	11.4
Zuliana	1,674,252	11.5
Insular*	200,048	1.4
Total	14,516,735	100.0

* Region not included in study.
Source: 1981 Venezuelan Census of Population and Housing, Oficina Central de Estadistica e Informatica (OCEI), Caracas, 1985.

The spatial disaggregations of the Venezuelan population reveal distinct geographic differences in average length of life. However, household location in terms of the region or rural or urban residence is not in itself an explanation of mortality differences. The patterns of higher rural mortality and the differences between regions reflect spatial disparities in the distribution of life conditions that, in turn, determine the level of mortality.[2]

[2]Prior to the late 1940s, geographic residence was an even more important mortality factor in Venezuela because of the specific environmental locations of vectors of malaria, yellow fever and other diseases. The Andes, for example, at one time provided a substantially healthier environment than most of Venezuela's lowland areas (Chapter III).

Social and Economic Determinants of Mortality

Household income differences and length of life

Empirical evidence from other studies has shown household income to be associated with mortality levels in other countries (Chapter II). To investigate the impact of income on years of life in the Venezuelan population and compare it to other variables, a series of mortality estimates were calculated for population subgroups, increasing the level of disaggregation as the controls for additional variables were introduced.

First, the household sample from the whole national population was subdivided into income quintiles and mortality estimates were calculated for each of the five groups (Table 5.4). The results indicate the expected positive association

Table 5.4
Life Expectancy at Birth by Income Level
1981 - All Venezuela

Income Quintile	Years of Life
1 (1-1399)*	65.3
2 (1400-2399)	67.7
3 (2400-3739)	68.6
4 (3740-6199)	70.5
5 (6200+)	70.7

* quintile income range in bolivares per month

between level of household income and length of life. People in the highest income bracket (6,200+ bolivares/yr.) were estimated to have a life expectancy at birth of 70.7 years,

or 5.4 years longer than those in the lowest income quintile (1-1,399 bolivares/yr.). These differences, while expected, require further decomposition of the population to control for other variables which might be associated with income.

The estimates for spatially disaggregated population groups revealed consistently higher mortality rates in rural areas (see Table 5.1). In order to control for income and compare rural and urban life expectancies, mortality levels were calculated by income quintile groups for the urban and rural populations separately (Table 5.5).

Table 5.5
Life Expectancy by Income and
Urban-Rural Residence

Income Quintile	Urban	Rural	Difference (Urban -Rural)
1	66.5	63.4	3.1
2	68.4	64.5	3.9
3	69.0	64.6	4.4
4	70.8	66.3	4.5
5	70.8	68.0	2.8
Average Difference			3.7

The effects of both income and rural-urban residence persist after controlling for the other variable. Estimates for each group show longer life expectancies as income increases in both the rural and urban areas. People in the highest income level in urban areas have about 4.3 years greater life expectancy than the lowest income group while

there is a difference of 4.6 years between the respective income levels in rural areas.

At the same time, each income group in the urban areas has a higher life expectancy than the corresponding income level in rural areas, the average difference for the five income levels being 3.7 years. It is notable that the life expectancy of the highest income population in rural areas (68.0 yrs.) is not quite as high as the second lowest income level in urban areas (68.4 yrs.). This observation suggests that low rural life expectancy is not simply accounted for by differences in income. From the discussion of the income variable (Chapter IV), we know that, in the lower income levels particularly, rural and urban incomes are not strictly comparable. At a given monetary level of income, real incomes in rural areas are often higher compared to urban incomes. Hence, the observed values underestimate the actual magnitude of the difference in life expectancy.

Regional life expectancy by income and urban residence

The population was further subdivided to compare regional differences in life conditions while controlling for income and rural or urban residence. The estimates obtained for the urban population of each region by income level is shown in Table 5.6.

Examining the urban estimates by region and income level does not reveal a distinct or systematic pattern of regional difference. There continues to be a general increase in life

expectancy as income rises for all regions, but each increment in income does not always show a corresponding increase in

Table 5.6
Urban Life Expectancy
By Region and Income

Region	Income Quintile 1	2	3	4	5
Capital	67.4	70.3	70.6	72.6	71.1
Central	65.5	69.2	68.1	68.9	70.7
West Central	64.3	67.3	67.3	70.2	70.2
Guayana	67.8	66.0	71.3	70.6	70.9
Andes	65.8	66.6	68.8	71.0	70.8
Llanos	66.2	64.9	67.9	68.0	73.1
Northeast	66.9	69.5	67.7	70.1	72.1
Zuliana	71.8	69.3	69.6	73.0	70.1

years of life. Estimates for some income levels are actually lower than the preceding quintile. This may be the result of the fact that the level of disaggregation has reached the point where the small number of cases in some of the cells is producing less reliable results.

The urban estimates for Zuliana region are even more irregular. The calculated estimate for the lowest income quintile is higher than those of all but the fourth income level. Since the inverse relationship between income and mortality has been empirically demonstrated in the rest of the mortality estimates for Venezuela, it is possible that the income data for some of the lower income categories in Zuliana may be defective. A partial explanation may also be

attributable to the sample size for this region, which is smaller because the sample is taken from only one state--Zulia, whereas the other regional divisions include the samples from several states.

Regional life expectancy by income and rural residence

It was not possible to obtain mortality estimates by income category for the rural populations of most regions because the level of disaggregation and the small percentage of the population residing in rural areas reduced the available cases to an insufficient number in some categories. However, a relatively high percentage of the Andean population lives in rural locations (27 percent), compared to other areas, and the regional administrative grouping includes four states, providing a fairly large sample. It is therefore possible to obtain mortality estimates for this area's rural population by income levels. Comparing the rural estimates in Table 5.7 with Table 5.6, shows that, for each income level, the Andean region's rural population has a lower life expectancy than any of the regional urban populations at the corresponding income quintile. Moreover, the differences are substantial, even at the higher income levels (Table 5.7).

It is useful to focus on the Andes and Capital regions for comparisons because the two represent, in a variety of ways, opposite ends of the spectrum of Venezuela's social and economic characteristics. Comparing the estimates for the corresponding income levels of the Capital region and the

rural Andes, there is an average of 6.5 years in life expectancy advantage for the Capital's population. The magnitude of the Capital's advantage is apparent when observing that the estimated length of life of the lowest income level in that region (67.4) is nearly identical to the highest income level (67.6) in the rural Andes.

Table 5.7
Life Expectancy Advantage
Capital vs Andes

Income quintile	Capital Region	Andes Region (rural)	Years Difference
1	67.4	61.7	5.7
2	70.3	62.8	7.5
3	70.6	62.8	7.8
4	72.6	64.5	8.1
5	71.1	67.6	3.5
Average Difference			6.5

Such comparisons illustrate why, for most of this century, the Andes region has been an area of population emigration and the flow of this migration has been primarily toward Caracas. These demographic parameters reflect the deterioration in the economic situation of the Andean population (see Chapter III) in what was perhaps the most prosperous region in Venezuela in the last century.

Education

The importance of the mother's education in reducing child mortality as shown by empirical evidence from other

developing countries (Chapter II) suggests mortality estimates for population subgroups specified by education level should yield substantial differences in length of life. Marked differences in quality of education and access to education facilities according to place of residence and socioeconomic status in Venezuela were noted in Chapter III. We can therefore expect the geographic and social distribution of this variable to be a factor in life expectancy differences between rural and urban residence and income levels.

Estimates of life expectancy were calculated for two categories of education, cross-classified by income level and urban or rural residence.[3] The lower educational category consisted of those women who had completed from zero to three years of school and the better educated group included those who had completed six to nine years of school. The categories separated the women into one group which was either illiterate or barely literate and another which had at least completed primary school or a few years of secondary level education.

The results (Table 5.8) show that education and rural or urban residence have an influence on mortality independent of income level. At all income levels, the lesser educated groups (0 to 3 yrs.) living in rural areas have the lowest

[3]It was impossible to subdivide the population by each year of school because of the small number of cases which remained after the other subdivisions of age, residential location and income. Therefore, two categories spanning four years were used.

estimated life expectancies and the better educated groups (6 to 9 yrs.) living in urban areas are estimated to have the highest life expectancies. When mothers with the same

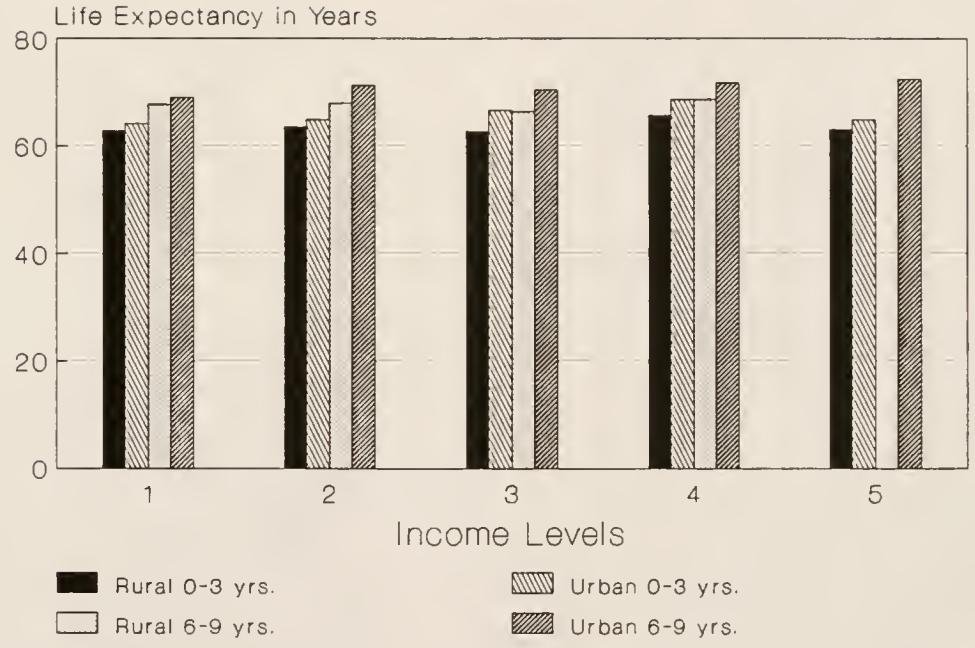
Table 5.8
Life Expectancy by Income, Education and Residence

Income Quintile	0 - 3 yrs. Urban	0 - 3 yrs. Rural	0 - 3 yrs. Dif.	6 - 9 yrs. Urban	6 - 9 yrs. Rural	6 - 9 yrs. Dif.
1	64.2	62.9	1.3	69.1	67.7	1.4
2	64.9	63.5	1.4	71.3	67.9	3.4
3	66.6	62.7	3.9	70.4	66.4	4.0
4	68.6	65.7	2.9	71.8	68.6	3.2
5	64.8	63.1	1.7	72.4	N.A.	-
Average Difference			2.3			3.0

educational level are compared, the life expectancy at birth of children in urban areas exceeds those from rural areas in all cases (Fig. V-2), averaging 2.3 years difference in length of life between the higher and lower educated groups in urban areas and 3 years in the rural locations.[4]

As Figure V-2 illustrates, when groups are compared by level of education while controlling for urban and rural residence, the population with the higher education level has a lower estimated mortality in each income quintile. The

[4] In the group of women in the highest income level, with 6 to 9 years of school and living in rural areas, the program's estimated level of mortality was outside the table's range. The number of cases available in this group was extremely small, there being only 63, 43 and 32 women in the 2q0, 3q0 and 4q0 groups, respectively.



Source: 1981 Census Sample of Venezuela

Fig. V-2. Life Expectancy by Income, Education and Residence

average difference in length of life between the two education levels in urban locations is 5.2 years and 4.0 years in rural areas (Table 5.9).

Table 5.9
Differences in Length of Life
By Education, Residence and Income

Income Quintile	Urban Difference (6-9) - (0-3)	Rural Difference (6-9) - (0-3)
1	4.9	4.8
2	6.4	4.4
3	3.8	3.7
4	3.2	2.9
5	7.6	N.A.
Average Difference	5.2	4.0

A comparison of the two tables shows that the average difference in length of life is greater between the educational categories than between rural and urban areas. However, since the educational categories selected and the rural versus urban classification are arbitrary divisions, a more detailed analysis would be required to assess their relative influence. Such a comparison of these and other variables is possible by regressing the variables under study on the individual mortality ratio data.

Childhood Mortality Covariates

The Trussesll-Preston method was used to calculate a mortality ratio for each woman in the sample. This ratio then served as a dependent variable in a regression analysis. The

objective is to estimate the relative weight of the various determinants of mortality, taking all of the independent variables into account simultaneously. The results are shown in Tables 5.10 and 5.11. Table 5.10 indicates that urban residence, household income, number of years of school and the presence of bath facilities in the home are all statistically

Table 5.10
Regression of Mortality Index of Children Born to Mothers 20-29 Years of Age on Selected Socioeconomic Variables in Venezuela, 1981

Independent Variables	Beta coefficient	T. signif.
Rural-Urban res.	-.018	.007
Log Hsld income	-.014	.039
Education	-.070	.000
Piped water	.006	.425
Toilet (sewerage)	-.012	.135
Bath	-.034	.000
Regions:		
Llanos	.016	.010
Guayana	.015	.023
Zuliana	-.007	.317
Northeast	.011	.105
Central	.029	.000
Andes	.031	.000
West Central	.024	.001
Adjusted R square		.013
Standard Error		1.627
N		29,229

Table 5.11
Means and Standard Deviations of
Variables Regressed on the Mortality Ratio of
Children in Venezuela, 1981

	Variable	Description	Mean	SD
1	Mortality Index	Standardized	.41	1.64
2	Area	Dummy variable (urban=1; rural=0)	.88	.33
3	Income	Log of monthly household income	3.46	.41
4	Mother's Education	Years of school completed	6.23	3.70
5	Piped water	Dummy variable (households with water=1; w/o=0	.60	.49
6	Sewage	Dummy variable (with sewage=1; without=0)	.57	.50
7	Bath	Dummy variable (households with bathroom=1; without=0)	.72	.45
8	Central Region	Dummy variables for all regions (persons living in region=1; out=0)	.16	.36
9	West Central		.15	.36
10	Guayana		.06	.24
11	Andes		.12	.33
12	Llanos		.04	.19
13	Northeast		.10	.30
14	Zuliana		.11	.31

significant variables with negative signs, indicating that increases in their value tends to reduce mortality.

Comparing the beta coefficients shows the mother's education is the strongest predictor in reducing child mortality. Next, in order of effect on reducing mortality, are a bathroom in the house, urban residence and household income. All are statistically significant at .05 or less.

Of the housing quality variables, only the bath facilities in the home was a statistically significant determinant. The presence in the home of a toilet connected to a sewer network is not statistically significant, although the sign is negative, as would be expected. Although piped water in the home shows a positive sign, it is also not a statistically significant variable.

Of the seven regions used in the equation, five--the Central, Llanos, Guayana, Andes, and West Central regions are statistically significant (at .05 or less) positive predictors of mortality compared to the Capital region, which was used as the reference and left out of the equation. Three regions, the Central, West Central and Andes are significant at .001 or less. Their beta coefficients show that residence in these regions is a stronger predictor of mortality than all but the education and bath facilities among the socioeconomic variables. Therefore, the mortality differences by region and by rural or urban residence are also the result of additional

factors that were not included among the social and economic variables used in the equation.

The Significance of Location

There are several probable or possible explanations of the persisting significance of the spatial variables when the distribution of the other selected mortality determinants are controlled. Differences in access to public health and social services is an important group of mortality determinants which are not part of the household sample data and could not be included with the other variables for analysis. Full medical services are part of the social security benefits provided to those who are covered by the program. However, the program does not yet apply to everyone in all parts of the country. The absence of social security coverage in some areas, particularly in rural locations, was noted in Chapter III.

The concentration of physicians in metropolitan areas also limits access to medical care for many parts of the country. In the Caracas metropolitan area there were 481 persons per physician in 1971 (Anuario Estadistico, 1971) while in some rural states -- Guarico, Sucre, Portuguesa, Yaracuy and Apure, the ratio was more than 2,000 to 1.

There are several national programs which provide nutritional supplements for infants, minors, students and families as well as prenatal nutrition care for pregnant women. The operations of these programs are carried out

through a number of state agencies which are likely to be concentrated in urban centers and Venezuela's more developed regions.

Another probable contributing factor to the unexplained higher rural mortality is the difference in quality of education between rural and urban areas. Both the Brass life expectancy estimates and the variable regression techniques necessarily use only the number of years of school as the measure of educational level. However, Chapter III emphasized that differences in quality of education between urban and rural areas are pronounced. Hence, comparing only the number of years of school often does not accurately portray the mother's educational achievement and conceals an advantage which contributes to the urban population's greater life expectancy.

Illegal immigration to Venezuela may also account for some of the differences. Many of the immigrants who have come illegally to Venezuela work in rural areas (particularly Tachira and other western states) and the mortality rates of their children may represent conditions in their former country.

Finally, there may be persisting differences in the incidence of specific diseases which may be associated with climatic or other variations in environmental conditions encountered in different parts of the country. Cultural practices such as wearing or not wearing shoes, an important

factor in tropical anemia due to hookworm infestation (Crist and Nissly, 1973), are also likely to vary from region to region and between urban and rural locations.

Summary of Results

The findings presented in this chapter provide quantitative indices of spatial and social differences in the material conditions of life in Venezuela. Several patterns are apparent from the mortality estimates. The results clearly show systematic spatial differences in length of life. Up to five years difference in life expectancy are observed between regions and as much as 6.6 years difference can be found between the rural and urban areas within individual regions. Between the lowest life expectancy of a region's rural population and the highest urban regional estimate, a maximum difference of 9.2 years was estimated. Urban life expectancies are consistently higher than those of rural areas. Moreover, the difference remains, although reduced, when important mortality determinants such as education and income variables are controlled through cross-classification. Using the mortality index regression to control for all the variables verifies that urban residence is a statistically significant predictor in reducing child mortality, net of the effects of the other variables in the equation. The results also show that residence in five of the nation's regions is a statistically significant factor in increasing mortality.

It is important to note that the observed differences in expected length of life between urban and rural areas are almost certainly conservative because of the historically high rate of rural to urban migration in Venezuela (Chapter III). Because the reference period on which the estimates of mortality are based may cover up to ten years prior to the time of the census sample, residential change probably took place for a substantial number of mothers. Many mothers classified as living in towns or cities may have resided in rural areas during some or all of their child-bearing years. The mortality rates of their children actually represents the conditions of rural areas, thus "contaminating" the data and most likely reducing the estimated differences between rural and urban areas. In this research, it was not possible to determine from the census sample data whether those who had moved to an urban center had previously resided in an urban or rural location.

A pattern of increased expected length of life was also demonstrated for children from higher income households. The differences in mortality between income levels are attenuated when the mothers' education and rural or urban residence are controlled but the variable is still statistically significant (.040) in the Trussell-Preston regressions. Although the effect of income is reduced when other important mortality determinants, such as education are controlled, income is

usually the means by which improvements in education, housing quality and other resources are acquired.

The mother's education was demonstrated in both the mortality estimates and the regression analysis to be the most important determinant of mortality. After controlling for income, an average difference of over five years in length of life was found between the two educational levels among residents of urban areas and four years difference was estimated for persons living in rural areas.

This research raises some questions for further inquiry. A major difference between the results of this study of mortality factors and other similar investigations is the insignificance of piped water and sewage facilities as mortality determinants in Venezuela. Using the Trussell-Preston mortality index regression technique, Wood and Carvalho (1988) and Wood and Webster (1988) found piped water and sewerage connection to be important mortality variables in Brazil. Merrick's (1985) study of the influence of piped water, also in Brazil, showed it to be the second most important variable (after education).

In Caldwell's (1979) study of mortality in Nigeria, the rural-urban mortality differences were largely explained by differences in the mothers' education. In Venezuela, spatial variables, both urban and rural residence and specific regions, were demonstrated to be statistically significant when the education variable was controlled. The Brass

mortality estimates also show a clear difference in expected length of life between urban and rural areas after cross-classification by income and education categories to control for those variables.

Placing the observed quality of life differences in a broader perspective, the upper income and/or better educated population groups in Venezuela's urban areas have a life expectancy exceeding 70 years or, roughly comparable to that of developed countries. In 1981, those groups at the bottom of the social and economic strata or located in less favored areas show an average length of life comparable to the average for the Venezuelan population twenty years ago, about 63 years. The estimates for the lowest income group in the rural areas of the Andes and Llanos regions are even lower.[5] The 61.4 years average life expectancy for the rural Andean population is only slightly better than the 60.7 year average for Guatemala (Wilkie, 1987), a country with less than one third of Venezuela's GNP per capita (in 1975) (Morawetz, 1977).

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[5]The average rural life expectancy for the Andes region is lower than the estimate for the lowest income quintile because the population declaring '0' income was included in the regional total estimates. An estimate of 57.8 years was calculated for this income category in the rural Andes -- the lowest figure produced in this research for any population group in Venezuela. This suggests that reported '0' incomes in this region were most often correct. In other areas, the '0' income groups' life expectancy often substantially exceeded some of the income quintile groups, casting doubt on the meaning of the '0' income response to the sample question (see Chapter IV).

Observed variations in life expectancy among selected populations in Venezuela are not pronounced compared to other developing countries, although they are larger than those commonly found in developed nations. Using the same demographic techniques in Brazil, Wood and Carvalho (1988) calculated more than twenty-one years difference in length of life between the rural population in the Central Northeast region and the rural residents in the South region in 1980. The comparable maximum difference between regions in Venezuela is only 9.7 years. Relative differences in wealth between the poorest and most affluent of Venezuela's population are not quite as large as in Brazil but other conditions also account for Venezuela's narrower range in estimated years of life.

For approximately forty per cent of the Venezuelan population, those in the two upper income quintiles, life expectancy in 1981 exceeded seventy years and is approaching the upper biological limits. In 1988, the average life expectancy for the whole population reached seventy years. A rapidly diminishing rate of return in years of life for increased inputs of material well-being and medical care is inevitable as this occurs. At the other end of the socioeconomic spectrum, the poorest groups have obtained improvements in health from substantial public investment in infrastructure and some public health programs which have benefited all income groups, such as the elimination of malaria and yellow fever. The provision of clean drinking

water is widespread, even in small towns. The success of these efforts has raised the "floor" or lower limits of life expectancy in Venezuela, thereby decreasing the possible range of variation.

CHAPTER VI
CONCLUSIONS

This research analyzed spatial and social patterns of mortality in Venezuela using life expectancy at birth as an indicator of the material well-being of population subgroups. Indirect demographic techniques were used to estimate differences in length of life between populations residing in rural and urban areas, different regions of the country, and between groups differentiated by their social and economic characteristics.

The review of leading development perspectives in Chapter II suggests that a nation's state of development should be viewed, not as positioned in a simplistic dichotomous division of developed and underdeveloped nations or in a linear group of stages, but as the outcome of complex interactions of causal forces on various levels, ranging from the specific locality to global processes. The need for a means of measuring the impact of development processes on the affected populations was emphasized. It was argued that traditional economic indices are insufficient to characterize important dimensions of development processes because they are tools developed in advanced market economies to measure production

output and do not adequately reflect the outcome of that production in terms the material well-being of the population nor the distribution of results. Efforts to develop other consumption measures of social and economic well-being for use in developing societies have not been satisfactory, frequently because the indicators required a large volume of accurate data from different sources or were not comparable internationally. Life expectancy at birth was posited as a useful cross-cultural indicator of the material conditions under which people live. The full potential for using mortality as an indicator in developing countries could not be exploited until the development of Brass-type indirect demographic techniques and the inclusion of the mortality-related questions in public use samples to circumvent the obstacles of deficient vital registration statistics (Chapter IV). Increasing availability of this data in census public use samples from developing countries has greatly facilitated demographic estimation, improved the accuracy of such estimates and expanded the range of options available for population analyses.

In Chapter III, the dramatic restructuring of Venezuela's social and economic realities was reviewed and the resulting patterns of social and geographic disparities in material well-being were noted. In this century, the economic conditions of the Venezuelan population was rapidly altered by a combination of profound political, social and economic

changes. The conjunction of these mostly fortuitous events posed an unusual opportunity for a developing country to accelerate and direct much of its own social and economic transformation, relative to the conditions and constraints faced by most underdeveloped nations. The populist, social-democratic oriented governments set simultaneous goals of economic growth and redistribution of wealth through social programs and spatial and sectoral economic planning. In effect, Venezuela's leaders approached development through a compromise between the neoclassical and the political economy paradigms, devising the country's own particular form of "state capitalism" that included state ownership of key economic sectors but remained dependent on world markets. National per capita income increased rapidly and life expectancy increased to the extent that it is now approaching the level of developed nations, over 68 years in 1981, and 70 years in 1988.

Despite impressive aggregate economic growth at the national level, substantial numbers of of people and large areas of the country did not obtain significant benefits from the petroleum boom. Income, investment, infrastructural improvements and social benefits continued to be concentrated in urban centers and the North Central part of Venezuela, the same areas which had enjoyed those advantages prior to the democratic governments. Benefits from the petroleum boom were also concentrated socially, generally accruing to a small

percentage of the population. In contrast, rural areas and the agricultural sector suffered increasing disadvantages in the national priorities after termination or reduction of some of the post-revolutionary programs to ameliorate conditions. This demographic investigation of mortality patterns in Venezuela measured the spatial and social disparities between population groups after two decades of rapid economic growth combined with national planning and management of the revenues derived from petroleum production.

The application of the Brass-type indirect demographic techniques in Venezuela achieved the aims of this investigation. Patterns of social and spatial disparities in Venezuela's development, characterized by a concentration of income, capital, services and human resources, were clearly reflected in differential mortality rates. On average, urban life expectancy exceeds that observed in rural areas by approximately five years, or seven per cent. When income is controlled, an average difference of 3.7 years between rural and urban areas is shown. A maximum difference was observed between the rural population of the Andes and the urban residents in the Capital region, where 9.7 years difference in expected length of life was estimated. Given the high rate of migration from rural to urban areas in Venezuela, observed differences in mortality between the two areas are conservative because migrants from the countryside are included in the urban mortality estimates. Between the

specified education levels (of the mothers) mortality differences of five years life expectancy in urban areas and four years in rural locations were estimated, controlling for income and urban or rural residence. These results, expressed in years of life expected at birth communicate significant information about the level of well-being of selected populations with little interpretation required.

Socioeconomic characteristics of individuals and housing quality variables identified in the literature as determinants of mortality were shown to be statistically significant variables in Venezuela, except piped water. The significant variables are: the level of the mother's education, household income and a bathroom in the home. The uneven spatial distribution of these factors was shown to be partly associated with observed geographic differences in mortality. However, when all of the variables used in this research were simultaneously controlled using the Trussell-Preston technique, residential location, whether defined by urban or rural residence or by region, remained statistically significant.

Several possible influences other than those examined were suggested as possibly contributing to the significance of the geographic variables. Spatial differences in access to medical facilities, incomplete geographic coverage by the social security system and child nutrition programs, poorer quality of rural education and possible environmental risk for

certain diseases are all possible mortality determinants which could not be included in this study.

Some questions for further investigation are raised by this analysis of mortality in Venezuela. The scope and objectives of this study were necessarily limited and focused on patterns as they existed in 1981. Hence, the mortality patterns revealed by the research are a snapshot or cross-section of conditions in Venezuela at the time of the census. They represent the end product of the far-reaching social and economic changes which have taken place, particularly in the two decades since the revolution.

A question that remains is what are the trends in those patterns of mortality over time? We know the extent of the overall national increase in life expectancy but not how different subgroups of the population have fared relative to each other. A comparison of this research with similar information from the previous census period(s) would show whether there has been a tendency toward convergence or divergence in quality of life between regions, rural and urban areas and socioeconomic groups.

The disparities in development and material conditions between regions, rural and urban areas and income levels were clearly shown in the nation's mortality patterns. The differences are relatively small when compared to results from similar studies in Brazil (Wood and Carvalho, 1988; Carvalho and Wood, 1978; Carvalho, 1974). However, the differences

appear pronounced when the results are compared to developed nations where, for example, in the U.S., less than half a year's difference in life expectancy exists between rural and urban areas.

Although average mortality levels are low in Venezuela, compared to other developing nations, inequities persist after more than twenty years of expenditures of substantial revenues from oil exports. It is clearly impossible to construct all facilities and implement all programs everywhere simultaneously and the concerted forces of politics and economics tended to favor expenditures in the urban areas. The movement of people to the towns and cities became, in itself, a force further accelerating the trend toward urban growth and economic concentration in the North Central Venezuelan metropolitan areas because political pressures focused attention on these areas (much of the electorate being concentrated there). Centralized organizational structure and decision-making, in both corporations and government, and even the creation of the state apparatus for planned decentralization all served to concentrate more people, jobs income and services in the Caracas Metropolitan Area and the adjacent industrial corridor.

Rural populations in Venezuela continue to suffer disadvantages in education, income and life expectancy compared to those residing in urban areas, though observed differences are small compared to other developing countries.

The issues involved are more than just an ideal of maintaining the rural way of life as a desirable option. The falling price of petroleum since 1983 and the consequent succession of devaluations in the bolivar's exchange rate means that the nation cannot continue to import 60 to 70 percent of its food. The financial crisis and civil unrest in Venezuela at the time of this writing reflects the fragile situation stemming from heavy dependence on a single export product while neglecting the domestic production of food and other essentials.

APPENDIX A
1981 VENEZUELAN CENSUS SAMPLE
SIZE AND WEIGHT FACTORS

State or Territory	Total Population (a)	Percent of National Population (b)	Sample Size (c)	Calculated Weight Factor* (d)
Distrito Federal	2,070,742	14.26	24,285	3.355
Anzoategui	683,717	4.71	26,529	1.014
Apure	188,717	1.30	22,735	.327
Aragua	891,623	6.14	24,859	1.411
Barinas	326,166	2.25	24,454	.526
Bolivar	668,340	4.60	27,677	.950
Carabobo	1,062,268	7.32	26,500	1.578
Cajedes	133,991	.92	22,782	.231
Falcón	503,896	3.47	25,491	.778
Guárico	393,467	2.71	25,327	.611
Lara	945,064	6.51	21,999	1.691
Mérida	459,361	3.16	25,078	.720
Miranda	1,421,442	9.79	27,113	2.063
Monagas	388,536	2.68	26,072	.587
Nueva Esparta	197,198	1.36	23,800	.326
Portuguesa	424,984	2.93	26,507	.632
Sucre	585,698	4.04	26,277	.878
Tachira	660,234	4.55	26,717	.973
Trujillo	433,735	2.99	22,366	.764
Yaracuy	300,597	2.07	25,566	.463
Zulia	1,674,252	11.53	33,310	1.978
T. F. Amazonas	45,667	.31	17,013	.104
T. F. Delta Am.	56,720	.39	18,011	.124
Dependencia Federal	850	.006	924	
Total Venezuela	14,516,735	100.00	571,392	

*Calculation of weight factor used in nationwide analyses:

$$d(\text{weight factor}) = \frac{b(.01)x571,392}{c}$$

*Source: Oficina Central de Estadistica e Informatica, 1981 Venezuelan Census, Resultados de Avance, Caracas.

APPENDIX B
COEFFICIENTS FOR ESTIMATION OF CHILD MORTALITY MULTIPLIERS, TRUSSELL VARIANT, WHEN DATA ARE CLASSIFIED BY AGE OF MOTHER

Mortality Model	Age Group	Index i	Mortality ratio[a] q(x)/D(i)	Coefficients a(i)	b(i)	c(i)
West....	15-19	1	q(1)/D(1)	1.1415	-2.7070	0.7663
	20-24	2	q(2)/D(2)	1.2563	-0.5381	-0.2637
	25-29	3	q(3)/D(3)	1.1851	0.0633	-0.4177
	30-34	4	q(5)/D(4)	1.1720	0.2341	-0.4272
	35-39	5	q(10)/D(5)	1.1865	0.3080	-0.4452
	40-44	6	q(15)/D(6)	1.1746	0.3314	-0.4537
	45-49	7	q(20)/D(7)	1.1639	0.3190	-0.4435

Estimation equations:

$$k(i)=a(i)+b(i)(P(1)/P(2)+c(i)P(2)/P(3))$$

$$q(x)=k(i)D(i)$$

[a]Ratio of probability of dying to proportion of children dead. This ratio is set equal to the multiplier k(i).

Source: United Nations, 1983, Manual X: Indirect Techniques for Demographic Estimation, Population Studies No. 81, p. 77, New York.

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BIOGRAPHICAL SKETCH

William W. Caudill was born in Lynchburg, Virginia, in 1944, and lived his early childhood years in California, Okinawa, and Texas before moving to Winter Haven, Florida, at the age of six. He received his baccalaureate degree in geography from the University of Florida in 1968. After marrying, he moved to Miami, where he lived until returning to Gainesville. He then entered a period of active duty in the Army Reserves prior to returning to the University of Florida, where he completed the Master of Arts in Teaching degree in 1975. Prior to graduation, he began employment as a transportation planner with the North Central Florida Regional Planning Council, where he remained through 1978. He then accepted a position as a socioeconomist with Plantec Corporation, an international consulting firm based in Jacksonville, Florida. He returned to Gainesville, Florida, in 1980 and entered the doctoral program in geography while working part-time during most of the period of study. He further developed his interests in Latin America, was awarded an NDEA Fellowship, and later received a Tinker Foundation Field Research Grant to pursue his research which culminated in this study of Venezuela.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Cesar N. Caviedes, Chairman
Professor of Geography

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Charles H. Wood
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Edward J. Malecki
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This thesis was submitted to the Graduate Faculty of the Department of Geography in the College of Liberal Arts and Sciences and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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